

LONGER LIFE

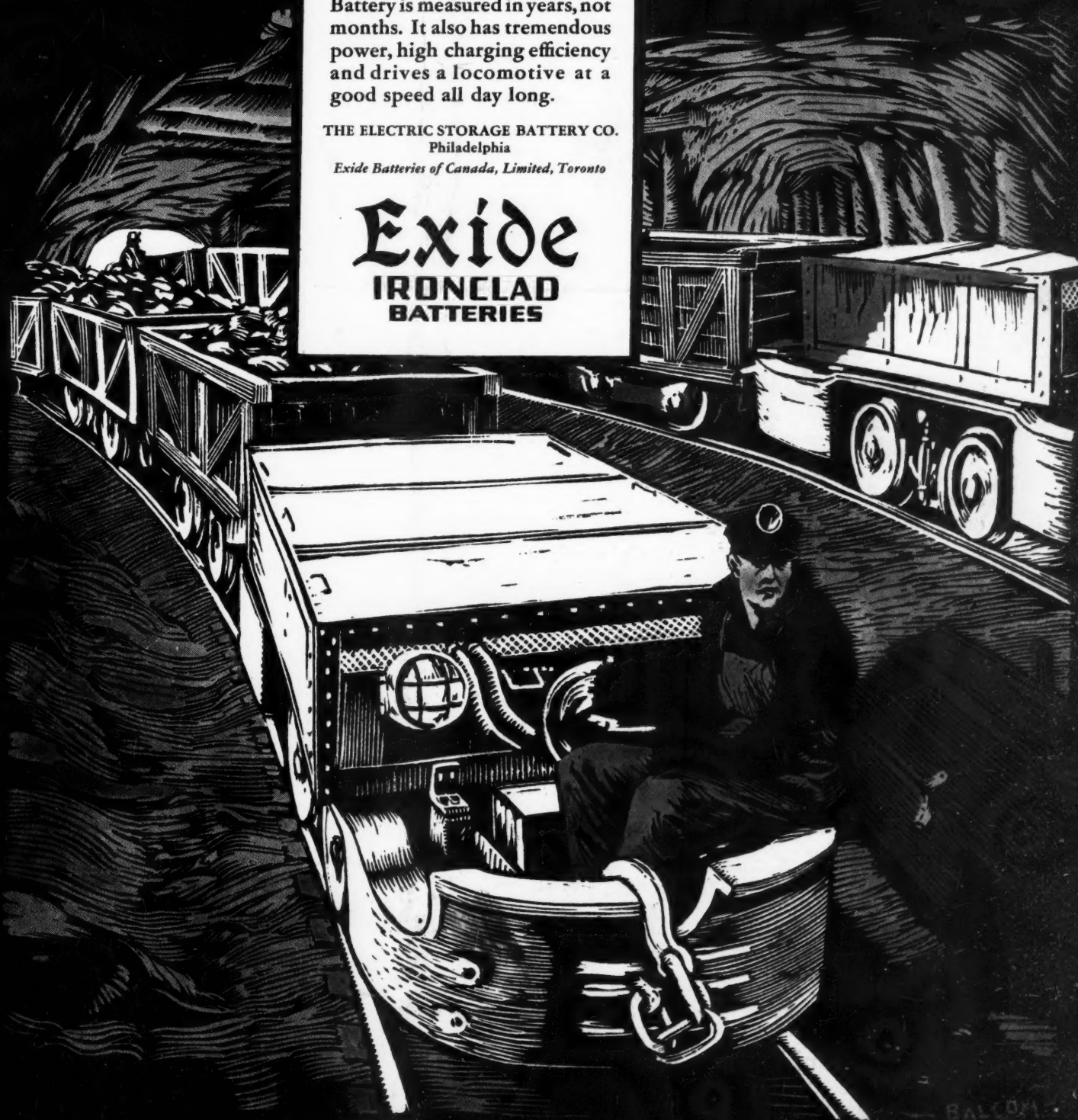
The life of an Exide-Ironclad Battery is measured in years, not months. It also has tremendous power, high charging efficiency and drives a locomotive at a good speed all day long.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia

Exide Batteries of Canada, Limited, Toronto

Exide

**IRONCLAD
BATTERIES**



Drawing Ribs With an Arcwall



Beginning the Cut

The Jeffrey 29-C Arcwall needs no jacks in slabbing across the rib. Any unevenness of the track is met by the flexible three-point suspension.

Finishing the Cut

This cut is made in a slate band. The Jeffrey Arcwall cuts as readily in hard, solid coal where no band divides the seam.



Three Other Arcwall Jobs

In thick, solid coal where there is no parting many operators use the 29-C for slabbing. They find that two light shots, one above and one below, produce more lump than the single heavy shot that uses an equal amount of powder.

When top cutting under weak roof, a Jeffrey 29-C will follow the top carefully, leaving no coal to be brushed down. The three-point suspension on heavy, motor-

driven jackscrews guides the cutter bar around any kettle bottom or other irregularity in the roof.

Bottom cutting with the 29-C leaves no wedge-shaped bottom for the loader to take up and provides a smooth surface for loading the coal and laying the track.

In room cutting, twenty-five places cut per shift is average performance.

For gaseous mines Jeffrey builds Government Approved Permissible Arcwalls.

The Jeffrey Mfg. Co., 912-99 North Fourth St., Columbus, Ohio

New York Philadelphia Scranton, Pa. Pittsburgh Chicago Charleston, W. Va. Salt Lake City Denver Montreal Birmingham

Sales and Service Stations

Pittsburgh.....600 2d Ave.
Scranton.....122 Adams Ave.

Salt Lake City.....153 W. 2d South St.
Birmingham.....26 S. 20th St.

Terre Haute, Ind.....319 Cherry St.
Winchester, Ky.....122 N. Main St.

50 YEARS OF SERVICE TO INDUSTRY
JEFFREY
COAL MINE EQUIPMENT

Jeffrey Standard Coal Mine Equipment

Coal Cutters
Combination Cutter and Loader
Drills
Conveyor-Loader
Sectional Conveyor
Pit Car Loaders
Locomotives
Mine Fans
Tippie Equipment
Crushers

FRANK H. KNEELAND
J. H. EDWARDS
SYDNEY A. HALE
JOHN M. CARMODY
Associate Editors
GEORGE J. YOUNG
Western Editor

COAL AGE

A. F. BROSKY, Pittsburgh
LOUIS C. MCCARTHY
FRANK J. G. DUCK
EDGAR J. GHALY
Assistant Editors
PAUL WOOTON
Washington Correspondent

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"
R. DAWSON HALL, Engineering Editor

Rock Tunnels Reduce Haulage Costs	719
Hardness and Toughness of Rocks Determined Experimentally	723
BY EMILE E. GYSS AND HENRY G. DAVIS.	
Is L. O. X. as Efficient as It is Claimed to Be?	726
BY J. BARAB.	
Safety Hoist Brake of New Type Has Many Advantages	729
BY C. H. S. TUPHOLME.	
Monopolism Deplored at Geneva	733
Tentative Pact on Working Conditions in Southwest; Still at Odds on Wages; Peace Efforts at Standstill Elsewhere	734
Lewis' Refusal to Debate Question of Wages Seen as Obstacle to Peace Between Union Miners and Operators	737
BY PAUL WOOTON.	
American Industry Studied at Geneva	736
Smokeless Men Meet in Bluefield	736
British Ministry to Amend Anti-Strike Bill	736
Railroads Offer Rate Cut	736
Ask Permanent Injunction in Maynard Case	737
American Mining Congress and Machinery Exposition Opens	738
Eight Trapped by Explosion in West Virginia Mine	738
Value of Better Methods and Co-operation Shown in Cutting Fuel Costs	738
Editorials	717
Current Prices of Mining Supplies	728
News Items from Field and Trade	739
Among the Coal Men	742
Obituary	742
Weekly Review and the Market	743
Foreign Market and Export News	748
New Equipment	749

McGRAW-HILL PUBLISHING COMPANY, INC.

Tenth Avenue at 36th Street, NEW YORK, N. Y.

NEW YORK DISTRICT OFFICE, 285 Madison Ave.
WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, 1600 Arch St.
CLEVELAND, Guardian Building
ST. LOUIS, Bell Telephone Building
SAN FRANCISCO, 383 Mission Street
LONDON, 6 Bouverie Street, E. C. 4, London

JAMES H. MCGRAW, President
JAMES H. MCGRAW, JR., V.-P. and Treas.
MALCOLM MUIR, Vice-President
EDWARD J. MEHRN, Vice-President
MASON BRITTON, Vice-President
EDGAR KOBAK, Vice-President
C. H. THOMPSON, Secretary

Cable Address: "Machinist, N. Y."
The annual subscription rate is \$3 in the United States, Canada, Mexico, Alaska, Hawaii, the Philippines, Porto Rico, Canal Zone, Cuba, Honduras, Nicaragua, Dominican Republic, Salvador, Peru, Colombia, Bolivia, Ecuador, Argentina, Chile, Spain, Panama, Brazil, Uruguay, Costa Rica, Guatemala, Haiti and Paraguay. Extra foreign postage \$3 (total \$6 or 25 shillings). Single copies, 20 cents.
Change of Address—When change of address is ordered the new and the old address must be given. Notice must be received at least ten days before the change takes place.

Publishers of
Coal Age
Engineering and Mining Journal
Engineering News-Record
Power
Chemical and Metallurgical Engineering
Ingénieur International
Radio Retailing
Bus Transportation
Electric Railway Journal
Electrical World
Industrial Engineer
Construction Methods
Electrical Merchandising
Electrical West
(Published in San Francisco)
American Machinist—European Edition
(Published in London)

Copyright, 1927
By McGraw-Hill Publishing Company, Inc.
Published weekly
Entered as second-class matter Oct. 14, 1911, at the Post Office at New York, N. Y., under the Act of March 3, 1879.
Printed in U. S. A.
Member Audit Bureau of Circulations
Member Associated Business Papers, Inc.
Number of copies printed this issue, 9,780

Cincinnati Conventicle Chronicled Next Week

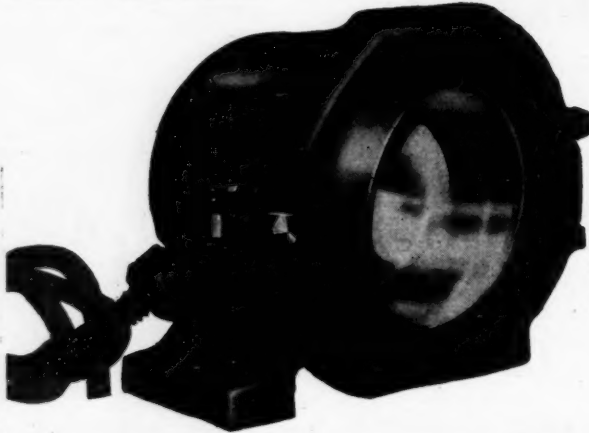
ONCE A YEAR the good fellows of the coal industry foregather at Cincinnati to discuss their mutual problems and learn from each other's experience. This year the meeting is scheduled for the current week and *Coal Age* has a whole flock of editors in attendance.

A year or two ago the big problem of the industry was mechanical loading; today it has been demonstrated that the loading machine alone cannot accomplish the end for which it was designed. Mechanical loading at the present moment is more a problem of management, of scheduling, of dispatching—in short, of getting the cars to and from the machine without delay—than it is a problem of machine design or construction. It has been practically demonstrated that the machine can do the work for which it is intended if given a proper chance. It remains, however, for the mining man to afford his equipment the opportunity to work, without which, no matter how rapidly it may put coal in the cars, it will not prove a success.

The convention at Cincinnati also affords an excellent opportunity for the men of the mines to see and get acquainted with the mechanical contrivances which have been developed to make mining easier and more efficient. The machinery exhibition probably is quite as essential to the mining man as the technical sessions.

O-B ENDURANCE IS SERVICE INSURANCE

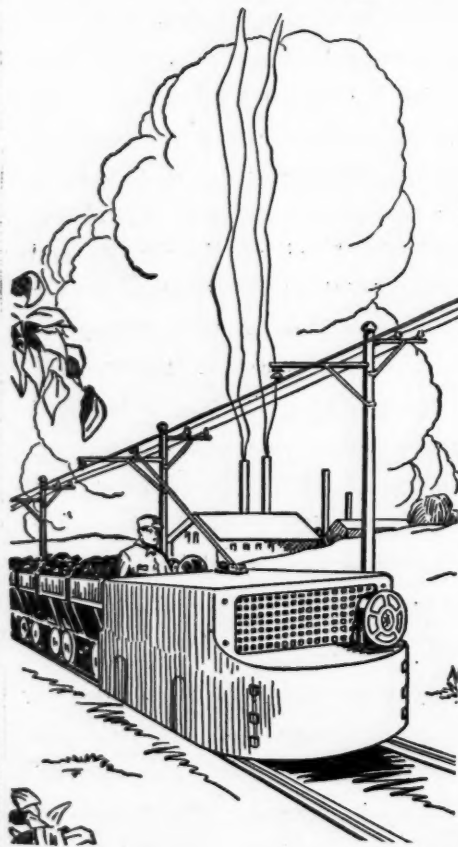
Type MB Cast Steel Headlight, with 5½-in glass reflector. Small, compact and sturdy, for gathering locomotives. Cat. No. 30450.



Type MS Cast Steel Headlight, with 8-in glass reflector protected by grids. Used for both main haulage and gathering service. Cat. No. 29629.



Cast Steel Headlights for Safety and Longer Life



YOU get out of a headlight only the service that has been built into it. In order to eliminate frequent headlight maintenance expense and insure safer operation and fewer delays to your locomotives, both of these headlights have casings and doors of extra heavy *cast steel*. You can depend on them to take the hardest knocks of service without damage—they are practically unbreakable.

As a further assurance of safety and longer life, both headlights are made with spring mounted lamp receptacles. Shocks received by the casing are not transmitted to the lamp filaments, but are absorbed by eight helical springs which support the lamp sockets.

For main haulage as well as gathering service, ample light is projected by the silvered glass reflectors used in each of these headlights. Neither moisture nor coal gas affects these reflectors. They provide high illuminating efficiency throughout the life of the headlight.

Use the Type MS Imperial Headlight for both main haulage and gathering service. Use the Type MB for gathering service. Order for trial, now. Or write for descriptive literature. Address

Ohio Brass Company, Mansfield, Ohio
 Dominion Insulator & Mfg. Co., Limited
 Niagara Falls, Canada
 402CM

Ohio Brass Co.

SALES OFFICES: NEW YORK CHICAGO PHILADELPHIA PITTSBURGH CLEVELAND SAN FRANCISCO LOS ANGELES

PORCELAIN
 INSULATORS
 LINE MATERIALS
 RAIL BONDS
 CAR EQUIPMENT
 MINING
 MATERIALS
 VALVES

COAL AGE

McGraw-Hill
Publishing Company, Inc.
James H. McGraw, President
E. J. Mehren, Vice-President

Devoted to the Operating, Technical and Business
Problems of the Coal-Mining Industry

R. Dawson Hall
Engineering Editor

Volume 31

NEW YORK, MAY 19, 1927

Number 20

No Place for Politics

ADDRESSING the legislature of West Virginia on May 3, the opening day of the extraordinary session, Governor Howard M. Gore criticised that body for its failure to confirm the appointment of Robert M. Lambie to succeed himself as chief of the Department of Mines. Those who have followed the course of West Virginia politics during the past two years are conscious of a lack of harmony between the governor and the legislature or an influential group within that body. With this situation *Coal Age* is not concerned; it is concerned, however, with the character of man chosen to head the department of mines and with his fitness for that office.

Few executive officers are charged with greater responsibility. The work calls for a high degree of technical skill, for courage, personality, resourcefulness, constructive executive ability and an understanding of complex human relationships. The rapid growth in the production of coal in West Virginia throws an ever increasing burden on the head of the department of mines and on his subordinates. The leader is charged with the protection of thousands of lives and of property worth millions of dollars. Safety work must be planned and encouraged; in some cases it must be enforced. First aid and mine rescue must be made part of the common practice of every unit of the industry. Mine inspection must be thorough, intelligent and fair. All this constitutes a job for a real man.

Coal Age is not here urging that the reappointment of Mr. Lambie be confirmed. It is the duty of the governor to appoint and of the state legislature to confirm or to reject. This periodical maintains, however, that neither Mr. Lambie nor any other state mining chief should be appointed or rejected because of his political relationship either to the governor or to the legislature of his state. The final selection should be based solely on merit—on the fitness of the man for his official responsibilities. If there be reasons other than "politics" for withholding confirmation in the case of Mr. Lambie these should be made public.

A Month's Shutdown

AT MOST if not all anthracite collieries, inasmuch as the product is sold largely, if not wholly, as a domestic fuel, the hot months of the summer are dull times. This is particularly true of the month of August, for then not only is the weather hot, so that little or no coal is needed, but this is the month when most people go on their vacations. Much of the mine output during this season of the year must accordingly go to storage.

It has been suggested, therefore, that at least some of the hard coal mines might advantageously shut down during this month. Such a shutdown would accomplish several things. It would not only stop the output at a time when it is least needed, but it would afford an

excellent opportunity to put hoists, breakers, washeries, and other equipment in proper condition for continuous operation throughout the balance of the year. It would afford a time for all employees in the operating department to have a good rest and be in good shape for the other eleven strenuous months of high-pressure production.

Both men and machinery give best results when working at or near their capacities. In like manner, both need rejuvenating periodically. While the machinery is being repaired by the mechanical department, the monthly operating men could be put on half pay and afforded an opportunity to go fishing or otherwise recuperate. So that when the time comes to start operations in the early days of September, all the operating force and all of the equipment should be in excellent fettle.

Practical Training

THE DECISION of Carnegie Institute of Technology to abandon its special two-year course in coal mining because of lack of support represents a challenge to coal operators everywhere but more especially to those in Western Pennsylvania. The course was designed to meet the needs of practical coal mining men, many of whom had not gone beyond the grade school. Their practical experience, however, acted as a splendid foundation on which to build a degree of engineering training that would make them better foremen and better superintendents.

The students taking this course have financed themselves. In the case of married men this has frequently meant that entire families have made sacrifices for years. Many of the men have loaded coal on Saturdays and holidays to earn tuition and board while in school. It is true that many students work their way through college but it requires a high degree of initiative and courage for men who have worked in the mines to give up earning and devote two years to study with its attendant expense.

The course itself "gets down to brass tacks." The men already have the flavor of the industry. Neither students nor instructors waste time. They know what the course ought to prepare them for. Their background of mining problems enables them to know how and where to apply their newly acquired engineering knowledge. There is a real need for these men as rapidly as they can be graduated.

Unfortunately conditions in the coal industry during the past few years have made it quite as difficult for prospective students to lay by the necessary tuition fees as for the operator to build up a surplus. Carnegie Institute, facing many demands upon its funds and its teaching energy quite appropriately becomes discouraged when only six or eight men register for this two-year course in coal mining.

It remains for operators to demonstrate that they are interested in this course and in the men so trained.

They can do this by co-operating with the committee appointed recently by W. L. Affelder, chairman of the advisory board, consisting of M. C. Angloch, of Vesta Coal Co.; W. H. Glasgow, H. C. Frick Coke Co., and W. E. Fohl, mining engineer. Co-operation of operators in Pennsylvania, particularly, with this committee will not only reopen this course but may even arouse their interest to the point where worthy men may be financially assisted to take it. The raw material is there; the training is available. *Coal Age* believes the coal industry will be well advised to make the modest investment necessary to win for itself the finished product—practical mining men plus two years of specialized training in the fundamentals of mining management.

Value of Goodwill

NOT SO LONG AGO a company sold its goodwill for \$50,000,000. It was enabled to obtain this sum owing to its persistent publicity and its marketing of a readily salable product with copyrighted name. This fact is fertile in suggestion. What is the goodwill of the average coal company? Some producers are not even seeking to lay the ground for any such profit. When the market improves their prices go up unreasonably and the quality of their product deteriorates. Goodwill for individual firms cannot thus be built up, nor can the industry as a whole attain such an asset by these methods. Some companies are trying to protect their goodwill by steady price and high quality. Others by mixing disks with their product or issuing stamps (one for each ton sold to be attached to delivery slips by retailers) are endeavoring to prevent inferior coal from being delivered in place of their own and as if supplied by them.

And goodwill between employer and employee is worth real money. It is generally stated that industry in Great Britain has been ruined by a lack of goodwill, the coal industry in particular, and coal operators in this country have not sought this intangible asset as consistently as they might have done. Overlooking goodwill is a short-sighted policy. Either a halter or a garland will be hung over the shoulders of the future; which it will be will depend on the character of the past. Any company that desires a future free of bickering and financial disaster must plan all its operations so as to guarantee its future. That does not mean solely that it shall comply with the letter of law alone or with the dictates of justice, but rather that it shall show such foresight, generosity and patience as is calculated to win the loyalty of its men.

A Tragedy of Waste

WHEN THE MIAMI CONFERENCE between the Central Competitive Field producers and the United Mine Workers broke up, unofficial forecasters of labor strategy said that the union would next propose district agreements and, failing in that, would seek to negotiate contracts with individual operators. Recent developments have attested to the soundness of those predictions. Indeed, there is concrete evidence that the union is ready to make individual agreements before the question of district settlements has been disposed of. At least one such contract already has been made and there are unconfirmed rumors that other individual two-year agreements are pending.

The present plan is to bind the individual operator to a renewal of the terms of the Jacksonville compact with the protective proviso that any change which may be incorporated in a more general contract will automatically become part of the individual agreements. Superficially such an arrangement seems more than fair to the individual operator since it assures him the benefit of any modifications which may be made later in collective bargaining with other producers similarly situated. Actually, however, the extension of this process of signing individual agreements will destroy all chance of a constructive readjustment in labor relations in the Central Competitive Field.

Every individual contract naturally encourages union officials to push their campaign for such settlements. Every individual contract makes it easier for some other operator to sign an independent agreement. Obviously if the movement gains headway, the time will come when the United Mine Workers will have sufficient tonnage signed up to say to the rest of the operators: "Here is the contract; take it or leave it." All hope of modifications vanishes. That part of the industry which cannot or will not turn to open-shop operation as the only way out again is saddled with the Jacksonville compact for another two years.

Neither the union operator nor the union mine worker would benefit from such an end to the present labor controversy. It would lead inevitably to a further contraction of the sphere of union influence and to still further decreases in the annual earnings of the union miners. It would lead, too, to a further unbalancing of production and distribution which in the long run would be harmful to the industry as a whole. Such a triumph of opportunism would be a tragedy of waste in which nobody would suffer more than the operators and miners who had made it possible.

Face Foremost

OPERATING FORCES at coal mines have been long educated to the old time-honored system of paying by tonnage. They have learned to pay more regard to the work of the men engaged in the smaller jobs around the mine. They have by long experience become accustomed to subordinating mining to transportation.

Though the law demanded the presence of the foreman where the miner was working, specified the frequency of his visits and did not require him to be at any time on the haulway or tippie, nevertheless it was only the odd moments that he put at the face.

Now that will all be changed. Interest as well as the law will make him visit the faces in person or by proxy. However, he will be slow to recognize that his interest has changed. After years of practice in one course of action it is difficult to recognize entirely new conditions requiring a new course of action and it may be necessary sometimes to let the foreman follow his bent. Men can be appointed to keep the face men in active operation and the foreman can be allowed to continue to supervise the mine in his own way and as in the days past. There will be need for expert men all along the line, the tippie boss, the haulage boss, the road boss and the face boss. So much has to be kept under observation in a mine, so many chances of mishaps and bad mining practice, so many miles of roadway, so many acres of working that it is well said that mining needs more supervision than any other operation and receives less.

Rock Tunnels Reduce Haulage Costs At Colonial Plants

IN THE ANTHRACITE REGION, as in the bituminous, "Bigger and Better Mines" has been the slogan of operation. This principle has often been exemplified when mines were brought under a common management by financial consolidations. In times past, this has often meant only the bringing of coal from drifts, slopes and even shafts, usually on the surface and with much increase in transportation distance and expense, to a large central breaker, increasing the tonnage of that unit and creating a diversity factor that afforded a more regular demand on the capacity of the machinery of preparation.

At one plant, at least, it has had a more radical connotation—the creation of entirely new and underground avenues of approach to the new breaker, by which the cost of operation has been greatly decreased. By this means the transportation cost has been lowered rather than raised, the preparation charges have been reduced and the disadvantages of outside haulage in the winter have been eliminated. The holding of cars on the surface where they will be exposed to the rigors of the winter and where the coal may be frozen also is avoided.

Colonial Colliery Co., an affiliation of Madeira, Hill & Co., had two breakers, the Natalie and the Greenough,

Coal is transported to new shaft and breaker through gangways in solid rock—Thus two breakers are replaced by one without the need to construct costly surface roads having railroad and highway crossings and either long detours up valleys or troublesome inclined planes.

5,800 ft. or roughly a mile apart, located in the Mt. Carmel-Shamokin district. One, which was built in 1900, had been operated by the Greenough Red Ash Coal Co., which later became affiliated with Madeira, Hill & Co. The machinery for preparation was regarded as obsolete having long circular screens for sizing the coal. The shaft, however, was still in good condition and would have rendered efficient service for many years.

The other was the Natalie breaker, a frame structure, erected in 1911. All the coal treated in this plant was hoisted by means of slopes and transported on the surface to the foot of the structure. Here a portion of it was dumped into a conveyor line, 54 in. wide, and conveyed by it to the top of the breaker. The rest was hoisted in mine cars to the same elevation.

As might be expected, this system required much rolling stock. Some idea of the extensive outside transportation problem of the old Natalie breaker can be gathered from the fact that there were on the surface six steam locomotives and 195 mine cars which traveled

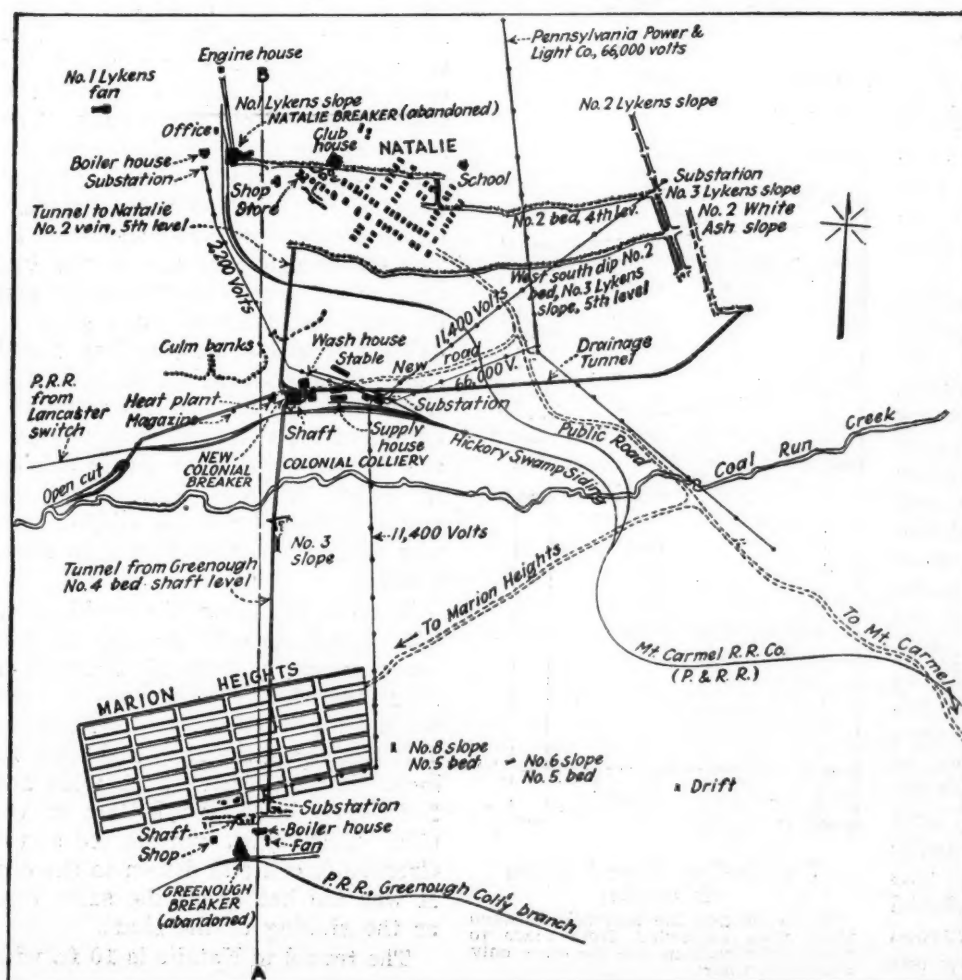


Fig. 1—The Two Old Plants and the New One by Which They Were Replaced

Coal Run Creek, or Hickory Swamp, lies exactly half way between the two old collieries and under it is a large synclinal. It seemed desirable to put the plant on solid ground and to sink the shaft through none of the workable coal seams but rather in the interval between them. So the Colonial Colliery Shaft is never likely to be drawn out of plumb by coal extraction. This accounts for the location chosen. Had the shaft been sunk in the heart of the Hickory Swamp, it would have been wet and would probably have been pulled out of line by mining on either side. AB is a cross-section line, and on it Fig. 2 is based.

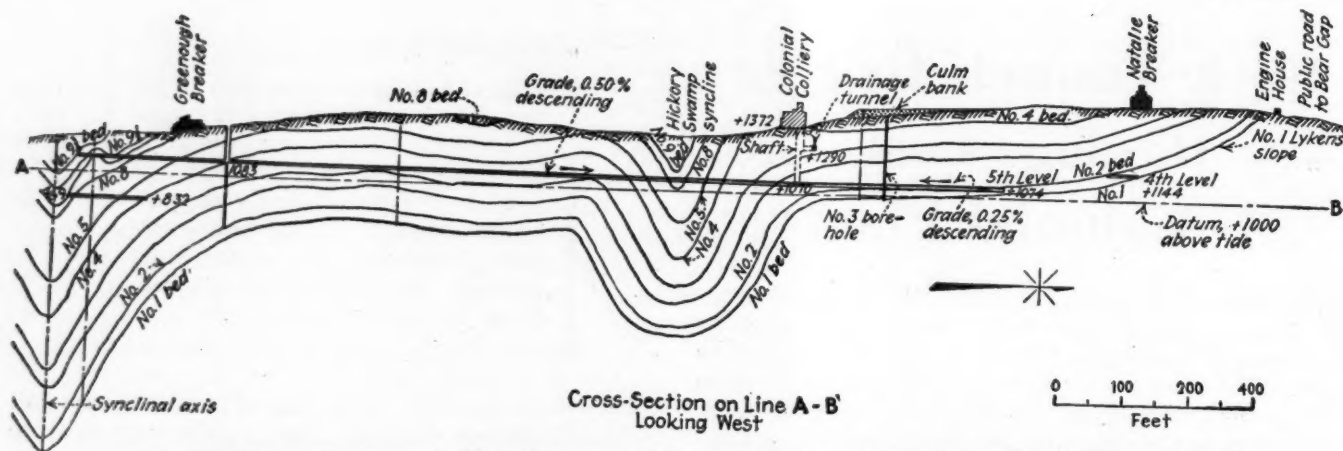


Fig. 2—Cross Section of Coal Measures Along Line A-B of Fig. 1 but to a Different Scale

Colonial Colliery is at the extremity of one of the "fingers" of the Western middle anthracite field. Consequently the measures lie relatively high; the lowest working is 832 ft. above tide and the shaft bottom is 1,070 ft. above the same level. The lowest convenient drainage point within the area permits of drainage at the shaft bottom to a level of 1,290 ft. above tide. It is easy to realize that, because of the

irregular folding, drilling gives but an indifferent knowledge of the lie of the seams, so that it is only when the measures are well developed by operation that good grades for haulage and drainage can be determined. Boreholes, however, do give some valuable information, and along the line of cross sections two holes have been sunk, one at the south end of the line near the Greenough shaft and one at the north

end near the Colonial shaft. The measures have in general a downward trend toward the south, so that near the Natalie slope quite a few seams are missing that the old Greenough operation developed. Near Natalie, however, some of the seams in which Greenough colliery was worked may be found to the eastward of this cross-section line. All measures worked are more or less bent and distorted.

over miles of track of 36-in. gage. On account of this extensive outside trackage, delays were frequent and production was greatly restricted, especially during the winter months when snow and ice accumulated and the run-of-mine coal froze in the cars.

This breaker had equipment for preparation, excellent in its generation but susceptible of improvement under more modern methods of coal washing. New breakers were needed, for the old ones were in bad condition and had heavy maintenance charges. With consolidation, the question naturally arose whether to build two new breakers or to erect a common breaker that could ship over both roads, would combine both tonnages and would have a common shaft which would be connected underground by a system of tunnels that would eliminate much of the expense of previous methods of transportation.

The problem when fully stated answered itself and a new breaker was erected with the necessary connections to both the Pennsylvania and the Philadelphia & Reading railroads. Where the new breaker should be placed was a matter much debated and carefully considered. Finally it was decided that it should be located on the north side of what is known as the Hickory Swamp basin. The location adopted required the sinking of a new shaft. Skip hoisting was seriously considered, but on account of the friability of the coal, it was feared that this would reduce the percentage of prepared sizes, so self-dumping cages were finally adopted. The new breaker not only prepares its coal with less expense but makes a better product than was formerly shipped. Thus the Colonial Colliery Co. has resolutely discarded both the old breakers for a new one

located at a convenient point between the two.

The shaft was located between the outcrops of the lower and upper seams as indicated in Fig. 2. It has two landing points, one about 80 ft. below the top of the collar and the other 300 ft. below the same point. The collar is 30 in. wide on top and 40 ft. deep. The shaft has four hoistways to the 80-ft. level and two to the 300-ft. level. Each compartment is 6 ft. 10½ in. wide and 12 ft. 6 in. long in the clear. The shaft also has a half compartment 4 ft. wide and 12 ft. 6 in. long. This extends the full length of the shaft and is used

for column pipes, wires, etc. The upper landing is a simple layout, because it has to contend with only one type of car and one track gage. The layout of the lower landing, however, was much more difficult because it had two track gages, and three different types of cars had to be handled on it. The Greenough cars are of the box type, of two capacities, 120 cu.ft. and 90 cu.ft. and have a track gage of 44 in. The Natalie car has flared sides, a capacity of 91 cu.ft. and a track gage of 36 in. To work the bottom of the shaft efficiently requires that cars of either gage can be hoisted in either compartment. This required a complicated track layout. It was finally solved as shown in Figs. 5 and 6.

In order to connect the workings of both operations with the new shaft it was necessary to drive 12,000 lin.ft. of rock tunnel. The tunnel to the Greenough workings is 12 ft. wide, 7 ft. high over the rails and 3,500 ft. long. It has a ditch 2 ft. wide and 2 ft. deep below the bottom of the sills. This tunnel was started at the Greenough end and driven to the dip. It was finished about the same time as the sinking of the shaft.

The tunnel to Natalie is 10 ft. wide

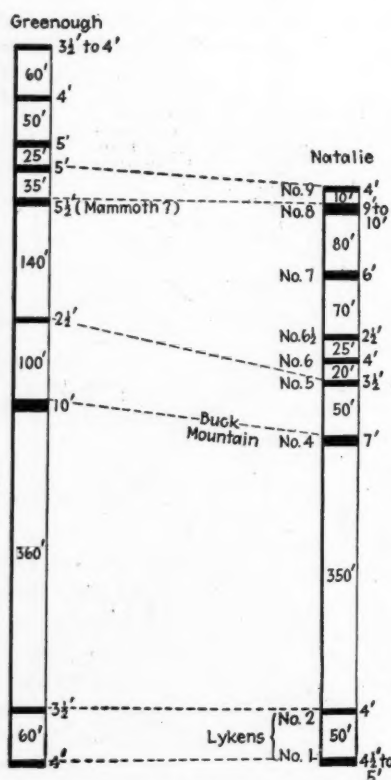


Fig. 3—Two Cross Sections Of Seams

The beds and the intervals between them vary somewhat from place to place. The sections are therefore only approximations.

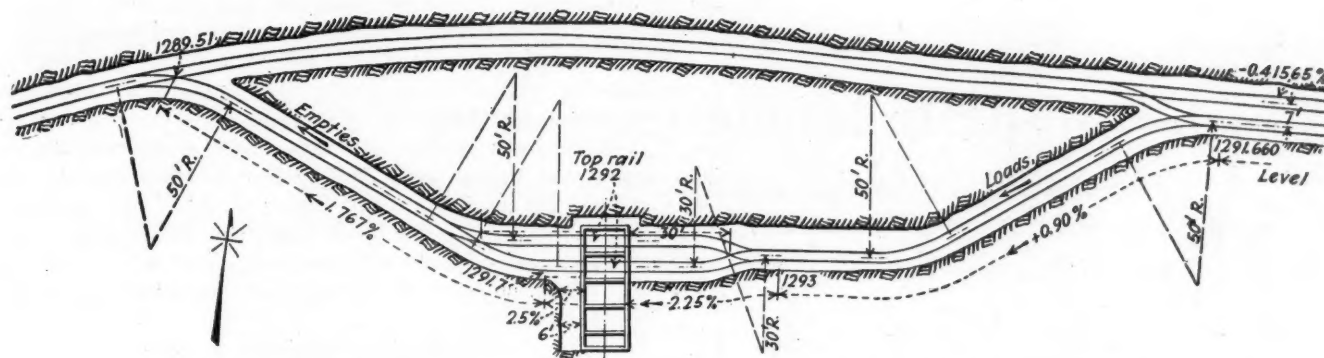


Fig. 4—Cage Landing at the Natural Drainage Level of the Colonial Shaft

The two southern compartments and the small pumpway run to the shaft bottom. Water is pumped from the lower landing to this level, either to be lifted to the breaker for use in preparing coal or to be drained by a tunnel to the surface

and 7 ft. high over the rails with a ditch 2 ft. wide and 2 ft. deep below the bottom of the sills. This tunnel was 1,550 ft. long and was driven from the Natalie workings. The ditch had to be made large in order to drain all water to a central pumping plant at the foot of the new shaft.

The drainage-level tunnel was started from the surface approximately 2,000 ft. west of the new shaft. It was driven on an ascending grade of 0.42 per cent to the workings of the No. 2 White Ash Slope, of Natalie, and was approximately 5,700 ft. long. This tunnel is 10 ft. wide and 7 ft. high with a 2 x 2-ft. ditch. It was started from both ends and rushed to completion. A connection was made with the new shaft at the 80-ft. level. This tunnel eliminated the No. 2 White Ash pumps and drained an area which has always given much trouble after heavy rains.

With seams having bad roof conditions and heavy grades, necessitating crooked roads and planes, it is frequently an extravagance to attempt to conduct main-haulage operations within the coal bed. A rock tunnel can be made straight and of even grade and will greatly increase the speed of transit, decrease the number of men employed, eliminate delays, decrease maintenance charges and increase safety. This principle, so effective in the reduction of the cost of operation has not been employed as frequently as might be desired. The conditions at the Colonial Mine where a tunnel can be driven in the rock at favorable grades for 5,640 ft. without leaving the coal-bearing measures, are well suited to the establishment of such a haulage and drainage system.

It will be noted that the lower tunnels are both arranged to have a down grade toward the Colonial shaft, mainly, of course, for drainage purposes. However, this aids haulage and reduces car resistance. The tunnel on the south running from the Greenough shaft has a fall of 0.5 per cent, so that the resistance to the empties will be approximately equal to that of the loads, making an ideal condition. The tunnel on the north that leads toward the old Natalie shaft has a grade in favor of the loads of 0.25 per cent.

As already stated, by means of the rock tunnels the water throughout the workings is brought by gravity to the Colonial shaft and is forced from the 300-ft. to the 80-ft. level by four centrifugal pumps having a total capacity of 10,000 gal. per min. Two of these were transferred from the Greenough plant. At the 80-ft. level there are two pumps, one of 1,500- and one of 1,000-gal. per min. capacity.

It is clear that the pumps in the lower level can deliver more water than the pumps in the upper level can handle, but it must be remembered that the full capacity, 10,000 gal. per min., of the lower pumps is utilized only in flood time. This large quantity of water is never needed for the operation of the breaker, so the excess water from the two levels is allowed to travel west to the surface through the drainage tunnel already described. Eventually the shaft will be deepened,

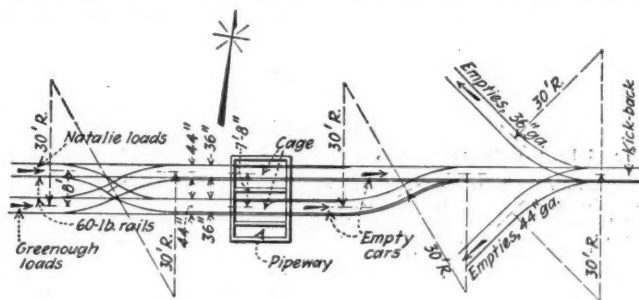


Fig. 5—Tracks at Bottom of Colonial Shaft

Note that there are only two cage compartments and one pipe-way. The other two compartments terminate at the natural drainage level 223.12 ft. above.

and new tunnels will be constructed which will be extended at least to the Hickory Swamp basin which lies just south of Colonial shaft. The Lykens No. 1 bed in the syncline reaches an approximate depth of 1,350 ft. as measured from the collar of the Colonial shaft. This problem, however, is a matter for a remote future, for like many anthracite properties that at Colonial has a large number of workable seams, the approximate thickness of which are set forth in two cross sections, Fig. 3. These thicknesses vary somewhat from place to place.

LYKENS COAL IS HARD TO DUMP

The Lykens No. 1 bed which is about 4 ft. thick at Greenough and from 4½ to 5½ ft. thick at Natalie, is a soft bed producing a coal that even with a car having a steel bottom does not dump readily. The Lykens No. 2 bed which is 3½ ft. thick at Greenough and 4 ft. thick at Natalie is a hard measure giving a large percentage of domestic sizes. These Lykens beds burn to a red ash. They are mined only at the Natalie end of the property where the coal measures tail out to the surface. Another of the important seams, the Buck Mountain or No. 4, a white-ash coal, covers almost the entire acreage. However, the No. 4 rises to the surface a little to the south of Natalie shaft. All the seams above it, shown

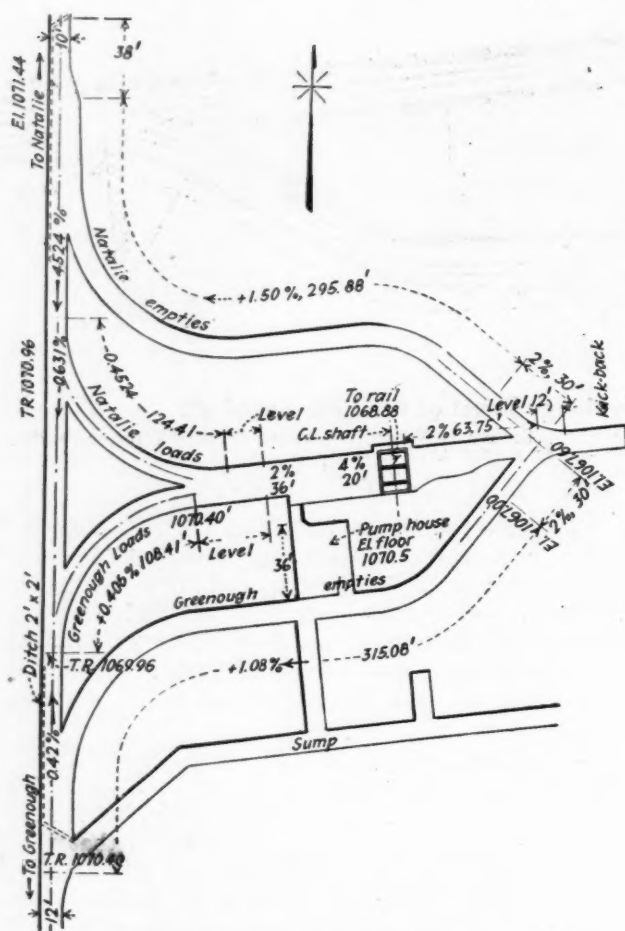


Fig. 6—Bottom of the Colonial Shaft

There is an approach from the Greenough Shaft and one from the Natalie with runarounds in two directions. As the roads are all in rock the grades are not made to suit the inclinations of the coal but are made solely to accord with most efficient operation. Easy curves make the car resistance light and reduce the likelihood of derailments. The absence of workings makes a symmetrical layout easy.

in Fig. 3, appear near Natalie but not at the shaft itself, some being mined by stripping methods.

In the Lykens beds, because of the presence of gas, the men are provided with electric cap lamps as a direct protection against explosions and with flame safety lamps also so that should any gas be present the men will be warned of its menace. This double protection against methane is quite usual in the anthracite region. It is a fairly normal condition of affairs to see all the men at a mine carrying both kinds of lamps. Thus every employee is enabled to ascertain without delay whether he is working in a dangerous atmosphere.

OPEN LAMPS ARE USED

The beds above the Lykens are operated by open lamps. The dangers of mixed lights in a mine—open and closed—is almost entirely removed where the two areas are separated by an interval of strata from 350 to 360 ft. thick, only connected through shafts. It is an altogether different condition from that which exists where the men are working with both kinds of lights in a single bed of coal.

It is true that the lower drainage tunnel cuts the upper seams near the Greenough shaft, where the upper beds are worked, and also the Lykens beds near the Natalie shaft. Thus there is a connection on a grade almost level, but between the two is the Colonial shaft and the distance is considerable. The trip could hardly be made without the man making it being subjected to

inspection. The upper beds are also cut in the Hickory Swamp, but there the upper seams are not being worked and, when they are, there will still be the necessity of passing the Colonial shaft in going from the upper workings to those in the Lykens.

Eighty-six mules and nine battery locomotives are used for gathering. Ten trolley locomotives are employed for main haulage. Three undercutting machines are used in the flat coal near the Greenough shaft. Scoop loaders, electrically operated, gather the coal from the faces, shaking chutes are also employed and a non-continuous belt loader.

This patented loader works like a roller blind. It is spread for three minutes during which time the men at the face load it with coal. It is then rolled up, the men having a breathing spell between loading periods. It gives excellent results, the men filling the belt industriously when the opportunity is afforded. As in many anthracite mines having several beds all of which are being worked the air currents are separated, each being actuated by its own fan. There are three of these fans at Greenough and an equal number at Natalie. There is, of course, a security in this manner of handling the ventilation problem, less water gage is required and leakage is accordingly less likely to occur.

The bottom layout is shown in Figs. 5 and 6. It will be noted that the tracks are of two different gages, which adds complication, but caging is effected without difficulty. The Natalie cars are of 36-in. gage and those from Greenough of 44-in., necessitating double rails on the cage and a short way in the 300-ft. bottom.

The upper or drainage-level bottom is shown in Fig. 4. Here cars of only one gage are assembled. All the four and a half compartments of the shaft can be seen in the line drawing, for all come to this level.

As will be seen, the bottom and upper mine landings are not in coal but in solid rock. The two little seams between the Lykens beds and the Buck Mountain or No. 4, are of negligible thickness and not worked. For this reason they are not included in the cross-section in Fig. 3. It will be noted that in the lower level of the shaft they are cut at a high angle, and in the upper level are more nearly horizontal and not cut at all.

The Pennsylvania Power & Light Co., a subsidiary of the Lehigh Power Securities Co. has three lines into the plant, so that there is no trouble from power failure. Current is received at 66,000 volts. One bank of transformers with a capacity of 3,000 kva. has a secondary voltage of 2,200 volts. This supplies Colonial Colliery with power. The other bank has a secondary of 11,000 volts and supplies power to the old Natalie and Greenough collieries. At these latter operations are step-down transformers that reduce the voltage to 2,200 and 440 respectively.

The 2,200-volt circuit from the 3,000-kva. bank is led into a switch house from which four feeders leave, each controlled by oil circuit breakers. They supply the following groups of machinery: (1) Hoists, (2) inside pumps, (3) breaker, (4) compressors and motor-generator sets.

The hoist to the 80-ft. level is driven by 300-hp. slip-ring induction motors. That to the 300-ft. level is of 900 hp. similarly driven. The latter machine is of the cylindro-conical type. Arrangements are made so that when the hoistman is called to raise men, he cannot hoist them beyond the top of the shaft even though he should forget to stop the machine or be incapacitated by heart trouble or other injury.

Hardness and Toughness of Rocks Determined By Various Experimental Methods*

Speed of Drilling, Placement of Holes and Quantity and Quality of Explosive Used, Important Factors in All Mining Operations, Could Be Estimated from Rock Tables—Such Data Will Greatly Help Engineers

By Emile E. Gyss and Henry G. Davis

School of Mines, Columbia University, New York City

IMPORTANT FACTORS in all mining operations requiring the removal of rock are the speed of drilling, the placement of holes and the quality and quantity of explosive used. These are functions of the hardness and toughness of the rock and must be considered in compiling a table that will enable a mining engineer or operator to estimate both drilling speeds and the quantity of dynamite required in any given rock. As a result, the hardness of a homogeneous rock may be described as its resistance to penetration by any agency, for example, by a steel drill bit. In the same manner, rock toughness may be defined as its resistance to disintegration or the rupture of its constituent minerals. Rock hardness, as here defined, is a function of the impenetrability of the component grains as well as of their size and arrangement, and the nature of the binding materials. The toughness of a rock is largely dependent upon the same factors but is measured by an entirely different method. The hardness of a rock is usually expressed in units that represent either relative values or alphabetical designations which have no definite quantitative equivalent. Dr. Robert M. Raymond† suggests that the composite hardness of rocks be measured in terms of the hardness of their constituent minerals based on Mohs' scale. This is done by multiplying the percentage of each mineral in any given rock by the Moh hardness of that mineral, adding these results and dividing by 100. The values thus obtained convey a clear understanding of rock hardness to the men interested or engaged in any kind of rock work. Tables I and II are based on such units.

Rock hardness as variously defined may be determined in different ways. One method, as indicated in the preceding paragraph, is that in which the

*Abstract of a paper entitled "The Hardness and Toughness of Rocks," presented before the meeting of the American Institute of Mining and Metallurgical Engineers, New York City, Feb. 14 to 17, 1927.

†Professor of mining engineering, School of Mines, Columbia University.

proportionate average of the hardness of the component rock minerals is taken as the basis of classification. Other factors, as the size, shape and arrangement of the grains and the tenaciousness of the binding minerals, are not considered. This system has been employed in the first column of Table I. As may be seen, there is a definite relation between the hardness so determined and the percentage of silica in the rock.

A second method, developed by the U. S. Department of Agriculture,‡ measures rock hardness by the loss in weight suffered by uniformly-shaped specimens of rock when held against a revolving disk composed of grains of quartz. The hardness of various rocks, as determined by this test, is given in the first column of Table II. These values are obtained by arbitrarily selecting 20 as the hardness of quartz and from this deducting one-third of the weight lost by each mineral specimen per 1,000 revolutions of the disk. The second column of Table

II was calculated from the hardness value of rhyolite given in the first column and from its corresponding value, 6.55, in Table I.

In these tests abrasion is the critical factor that measures hardness and the influence of impact is negligible. As the latter plays an important part in all drilling operations, the second method measures rock hardness only in part. However, several authorities have considered such data the most satisfactory from which to compile tables of rock hardness.§

A third method of classification has been proposed by Harley.* Determinations of rock hardness for underground operations are made by the drill-test method

‡Frank H. Jackson, Jr., "Methods for the Determination of the Physical Properties of Road-Building Rock," U. S. Department of Agriculture, Bulletin No. 347.

§Notably, W. O. Snelling in a paper presented before the Engineers Society of Western Pennsylvania; N. G. J. Young, "Elements of Mining," p. 98; and H. P. Gillette, "Handbook of Rock Excavation," p. 439. Since these tables were prepared, many more hardness determinations have been made and these are included in Table II.

*G. Townsend Harley, "Proposed Ground Classification for Mining Purposes," *Engineering and Mining Journal*, Vol. 120, No. 10, Sept. 4, 1926, p. 368-372, and Vol. 120, No. 11, Sept. 11, 1926, p. 413-416.

Table I—Variation of Rock Hardness
With Silica Content*

Kind of Rock	Hardness Based on Mineral Composition	Per Cent Silica in Rock
Chert.....	6.95	98
Quartzite.....	6.63	95
Rhyolite.....	6.55	76
Granite.....	6.54	74
Granite Gneiss.....	6.51	73
Biotite Granite.....	6.49	71
Granite Diorite.....	6.40	70
Quartz Monzonite.....	6.37	68
Dacite.....	6.35	67
Trachyte.....	6.35	65
Quartz Diorite.....	6.31	66
Syenite Gneiss.....	6.31	66
Syenite.....	6.30	66
Peridotite.....	6.28	42
Diorite.....	6.26	62
Augite Andesite.....	6.25	60
Andesite.....	6.17	62
Gabbro.....	6.14	53
Sandstone.....	6.13	..
Diorite Gneiss.....	6.11	58
Feldspathic Quartzite.....	6.10	..
Basalt.....	6.09	50
Diabase.....	6.04	52
Biotite Gneiss.....	5.92	..
Gabbro Gneiss.....	5.83	50
Hornblende Gneiss.....	5.83	..
Pyroxenite.....	5.67	51
Hornblende Schist.....	5.63	..
Bitote Schist.....	5.50	..
Calcareous Sandstone.....	5.41	..
Mica Schist.....	5.20	..
Limestone.....	3.70	..
Marble.....	3.20	..

*Data in this table compiled from H. S. Washington, "Chemical Analysis of Igneous Rocks," U. S. Geological Survey, Professional Paper No. 99, and E. C. E. Lord, "Relation of Mineral Composition and Rock Structure to the Physical Properties of Road Material," U. S. Department of Agriculture Bulletin No. 348.

but, instead of expressing it as a function of the drilling speed, the foot-pounds of energy required to cut a unit volume (usually 1 cu.in.) of rock from a drill hole is taken as a measure of its penetrability. This method eliminates those variables, such as type of drill, air pressure and bit size, which exist in other tests of this type. The units used by Harley are alphabetic and, without careful study, have but little meaning. The hardest rocks, or those requiring the greatest energy to drill a hole of unit volume, are classed as A+, A and A-. The softest rocks, or those requiring the least energy per unit volume drilled, are classed as D+, D and D-. Rocks intermediate in hardness between these groups are classed as B+, B, B- and C+, C, C-.

Application of this nomenclature to different rocks, such as granites, syenites, diabases, etc., is not indicated by Mr. Harley. Whether drill-speed or energy-volume measurements are used in this method, the comparative results will be influenced by the age and condition of the machine, the kind of drill steel used, the method of tempering and the shape of the bit. As recommended by Harley, the personal equation in drilling is largely eliminated by using a vertical stopper drill.

Although Tables I and II are of interest, a more valuable classification could be obtained from comparative drilling speeds and energy consumptions per unit volume of hole drilled. These data, on rocks of different types and classes, could be obtained from mine operators in various sections of the country. In order that testing conditions may be as uniform as possible, the following recommendations are made: Some standard make of machine drill should be used. Ingersoll-Rand rock drills are preferable as these machines are widely distributed and have been carefully tested on Quincy granite. A vertically operated stopper drill is best as it eliminates any variations that may be introduced by the runner and also reduces the friction of the bit on the side of the hole.

The air pressure should be kept constant at 80 or 90 lb. per sq.in. and the drill bit should have a double taper with a 90-deg. cutting edge. The bits, preferably,

should be 1½, 1¼ and 1⅜ in. in diameter. The hole should first be collared to a depth of about 2 in., after which a new steel should be inserted and the machine run for about one minute. The depth and average diameter of the hole, as well as the exact time that the machine was in operation, should be determined so that both the drilling speed and the energy required per unit volume of rock penetrated could be calculated. Five to ten such tests on each different kind of rock would give results that would be both helpful and useful. So that it may be properly classified, a complete description of the rock, so far as possible, should also be given.

There are yet a number of variables in the method of test just described. However, by using as new a machine as possible, or one that has been recently overhauled, the difference in energy between that developed by new and old machines will be greatly decreased. Steel tempered by standard methods should largely eliminate the variable hardness of the drill bit.

SHAPE AND COHESION LARGELY FIX TOUGHNESS

A table showing the relative toughness of rocks should also indicate the relative amount and strength of explosive required for breaking them most economically. The toughness of a homogeneous rock is largely determined by the shape and arrangement of the component grains and by the tenacity of the binding minerals. However, the principal difficulty in compiling such a table lies in the fact that rocks are not homogeneous, uniform, massive and unaltered.

In addition, the character and proximity of fractures, bedding planes, slips and shear planes, as well as the degree of alteration, will introduce further variables in any series of practical tests designed to determine, directly by a method of explosive consumption, the toughness of any given rock. The following factors, in addition to rock toughness, will also influence the consumption of explosive per unit of material broken:

- (1) The strength and character of the explosive;
- (2) the depth, size, number and orientation of the holes;
- (3) the desired size of the blasted product; and
- (4) the number of free faces of rock blasted.

In arriving at approximate determinations of the explosive energy required in blasting, Harley* has taken some of these factors into account. He has developed a relation between the power input of a drill in cutting a hole of unit volume and the effective explosive energy required to break a unit volume of rock. The work done in both instances is measured by the reciprocal of the mean diameter of the comminuted rock. This is expressed by the equation:

$$\frac{\text{Power input of drill per cu.in. of rock removed}}{\text{Effective work of explosives per cu.in. of rock broken}} = \frac{\text{Reciprocal of the mean diameter of rock-drill cuttings.}}{\text{Reciprocal of the mean diameter of pieces in the ideal muck pile}}$$

This proportion is corrected by two factors. One is a function of the number of, and distance between, slips, shear planes and lines of weakness. The other is a toughness factor which is a function of the structure, texture, and chemical composition of the rock.

At present no such data as this is available from which to compile a rock table. However, an extensive series of tests on rock toughness, using a Page impact

Table II—Mineral Hardness As Found by Various Methods*

Kind of Rock	Hardness in U. S. Dept of Agriculture Units†	Hardness Recalculated to Mohs' Scale	Hardness from Table I
Chert.....	19.4	6.95	6.95
Quartzite.....	18.9	6.77	6.63
Hornblende Granite.....	18.6	6.67	.....
Feldspathic Quartzite.....	18.5	6.63	6.10
Rhyolite.....	18.3	6.55	6.55
Granite.....	18.3	6.55	6.54
Fresh Diabase.....	18.3	6.55	6.04
Augite Syenite.....	18.3	6.55	.....
Diorite.....	18.2	6.52	6.26
Trachyte.....	18.1	6.48	6.33
Syenite.....	18.0	6.45	6.30
Biotite Granite.....	17.9	6.41	6.49
Basalt.....	17.8	6.38	6.09
Granite Gneiss.....	17.7	6.34	6.51
Gabbro.....	17.7	6.34	6.14
Hornblende Gneiss.....	17.6	6.30	5.80
Amphibolite.....	17.5	6.27	5.82
Andesite.....	17.0	6.09	6.17
Hornblende Schist.....	17.0	6.09	5.60
Mica Schist.....	16.9	6.05	5.20
Biotite Gneiss.....	16.1	5.95	5.92
Biotite Schist.....	16.1	5.77	5.50
Calcareous Sandstone.....	15.8	5.66	5.41
Chlorite Schist.....	15.4	5.52	.....
Slate.....	15.0	5.38	.....
Dolomite.....	14.9	5.23	.....
Feldspathic Sandstone.....	14.6	5.24	.....
Sandstone.....	14.4	5.16	6.13
Periodotite.....	14.2	5.09	6.28
Limestone.....	14.1	5.05	3.70
Marble.....	13.1	4.69	3.20

*The data given in this table represent average figures as determined from hundreds of specimens of rocks classed under any one name. With few exceptions, the hardness values from Table I check fairly closely with those presented here and which were obtained by entirely different methods.

†U. S. Department of Agriculture Bulletin No. 348.

*Loc. cit.

Table III—Toughness of Various Rocks

Kind of Rock	Drop-Test Toughness Height in Cm.	Relative Toughness $L_s = 1$	Relative Wear Deval Test, $L_s = 1$
Diabase.....	25	2.8	2.28
Basalt.....	20	2.2	1.80
Feldspathic Quartzite.....	20	2.2	1.73
Pyroxene Quartzite.....	19	2.1	1.73
Amphibolite.....	19	2.1	1.80
Altered Diabase.....	19	2.1	1.93
Rhyolite.....	19	2.1	1.35
Andesite.....	18	2.0	1.28
Altered Basalt.....	18	2.0	1.66
Diorite.....	17	1.9	1.66
Slate.....	17	1.9	1.14
Quartzite.....	17	1.9	1.51
Hornblende Schist.....	16	1.8	1.14
Augite Syenite.....	15	1.7	1.51
Gabbro.....	14	1.6	1.66
Calcareous Sandstone.....	14	1.6	1.20
Hornblende Gneiss.....	14	1.6	1.35
Chlorite Schist.....	14	1.6	1.16
Hornblende Granite.....	13	1.4	1.31
Feldspathic Sandstone.....	13	1.4	0.81
Granite.....	12	1.3	1.35
Chert.....	12	1.3	0.54
Peridotite.....	11	1.2	1.25
Biotite Schist.....	11	1.2	1.09
Sandstone.....	10	1.1	0.81
Granite Gneiss.....	10	1.1	1.10
Mica Schist.....	10	1.1	0.93
Biotite Granite.....	9	1.1	0.93
Limestone.....	9	1.0	1.00
Dolomite.....	9	1.0	0.91
Biotite Gneiss.....	8	0.9	0.86
Marble.....	6	0.7	0.88

machine, has been made by the U. S. Department of Agriculture. In these determinations a falling weight is repeatedly dropped, through successively increasing distances, on the rock specimen, until it is eventually crushed. The height, in centimeters, through which the weight falls when failure of the sample occurs is recorded as the toughness of the material. These values are given in the first column of Table III. The second column shows the relative values, considering limestone as unity. The third column represents the relative wear produced on particles of various rocks, again considering limestone as unity, when these are tested in the Deval abrasion apparatus. This is a cylindrical mill whose axis is at an angle with the axis of rotation. The feed is sized and no rock or metal balls are added. As the wear in this machine is produced both by impact and by abrasion, the results should give some indication of the hardness of the rock and, to an even greater extent, its toughness. In a general way, these values check with those found as holding true of rock toughness.

MOHS' SCALE USED IN TABULATION

The preceding compilations of rock hardness and toughness have been made by using Mohs' scale of scratch hardness and data from the U. S. Department of Agriculture. Alphabetical indications of hardness have been replaced by numerical values, as these have a clearer and more exact meaning to the engineer. To supplement these tabulations, a standardized method of determining drilling speeds and energy consumption per unit volume of rock drilled has been suggested. When data from these latter tests are available, a table can be compiled from which the drilling speed, under standard conditions, in any given rock may be closely estimated.

The table of relative toughness should also be supplemented by information regarding the character and quantity of explosives required for the most economical breaking of all kinds of rock. If the determinations proposed by Harley* were carried out on a large number of rocks, much useful information would thereby become available.

*Loc. cit.

To Prevent Explosions, Oxygen in Air Should Be Cut Below 5 per Cent

Generally speaking, three conditions determine the explosibility of a dust, vapor or gas. These are: (1) The combustibility of the substance; (2) the supply of oxygen available; and (3) the source of ignition.

Combustible material must necessarily be present under practically all mining conditions and in many industrial processes. Therefore, prevention of explosions must be controlled by the proper regulation of the oxygen supply or source of ignition, or both. It has been shown that when the oxygen present in a gas mixture containing methane is reduced to 12 per cent (the inert gas being nitrogen), all proportions of methane are rendered non-flammable and, therefore, non-explosive. However, during abnormal conditions such as obtain after mine explosions or during mine fires, products of incomplete combustion (such as hydrogen and carbon monoxide) are formed together with varying proportions of carbon dioxide and nitrogen.

Under these conditions it becomes important to know to what extent the oxygen in the atmosphere must be reduced in order to render these mixtures non-flammable so that recovery work may go forward with safety. Tests conducted over the entire flammable range of hydrogen, carbon monoxide, and methane indicate that hydrogen flames will propagate when the percentage of oxygen amounts to from 5 to 6 per cent by volume depending upon the proportions of hydrogen present. Flames of carbon monoxide will propagate when the percentage of oxygen present in the air equals 6 per cent. The results of these tests warrant the conclusion that to render mixtures of the three flammable gases (methane, carbon monoxide and hydrogen) non-flammable, the percentage of oxygen present in the atmosphere must be reduced far below 12 per cent (the value required for the extinction of the methane flame). As a safety measure to cover all conditions where hydrogen or carbon monoxide is present, the oxygen should be reduced below 5 per cent to be certain that explosions will not result.

These conclusions are based on conditions of temperature and pressure that can be tolerated by rescue workers. Conditions of exceptionally high temperatures and pressures will necessarily alter the conclusions given.—G. W. Jones and G. St. J. Perrott, in a paper presented at the annual meeting of the American Chemical Society.

Gandy Envisages Prosperous Future

If we utilize every ounce of the theoretically available water power east of the Mississippi River and north of the Ohio, where the major market for mechanical energy is located, it would result in the displacement of less than 5 per cent of the present bituminous production, which last year amounted to 578 million tons. It is generally agreed that there will be little, if any, increase in oil production, and as the demand for the lighter products of petroleum increases, the supply of fuel oil will grow smaller and prices will rise. The logical conclusion to be drawn is that the rate of increase in coal consumption will henceforth be in step with the industrial progress of the nation. It is on this logic that my firm conviction of a prosperous future for the bituminous coal industry is based.—Harry L. Gandy, at meeting of Cincinnati Chamber of Commerce.

Is L. O. X. as Efficient as It Is Claimed To Be?

Impression Is Created that Better Results Are Secured at Less Cost, but When All Things Are Considered This May Be Open to Question—Data Apparently Shows It More Expensive Than Powder

By J. Barab

Hercules Powder Co., Wilmington, Del.

THE IMPRESSION Mr. Holderer apparently tries to convey in his paper is that L. O. X. is more effective and more economical than black blasting powder, which was formerly used at the coal stripping operations where the experiments he describes were conducted. I shall discuss each of his conclusions separately as a distinct unit.

Ordinarily in stripping overburden where holes are sprung, the spacing is considerably greater than at the operation described in this paper. A number of strip mines space their shot holes 30 x 35 ft. The fact that 63 per cent more drilling was done during the period when L. O. X. was used, as compared with a corresponding period when black blasting powder was employed, and that practically the same yardage of overburden was moved in both instances does not check with his statement that the 18 x 18 ft. average spacing of holes when blasting with L. O. X. "was the same spacing previously used with black powder."

Footages drilled according to the figures given were: In 1926 (using L. O. X.), 202,945 ft.; in 1925 (using black blasting powder), 127,596 ft.; or 75,349 ft. more in 1926 than in 1925. If we assume a drilling cost of 25c. per foot, which is a rather low figure, the increased cost of drilling for 1926 over the corresponding period in 1925 was \$18,837.25.

Mr. Holderer says: "62.09 per cent more footage was drilled in the 1926 period than in the same period in 1925. This was brought about directly by the use of L. O. X." We must therefore conclude that the additional drilling cost of \$18,837.25 is also the direct result of the use of this explosive.

It is said that the ground was more thoroughly shattered by L. O. X., making easier digging for the shovel, and attention is called to the fact that the average depth of overburden removed was greater in 1926 than previously. These would be points in favor of L. O. X. if the number of cubic yards of overburden removed in 1926 was appreciably greater than for the 1925 period. But, as shown, practically the same volume of overburden was removed in each of the periods compared.

Table 2, gives a comparison of the cost of labor for blasting with L. O. X. and with black powder. The cost of labor in 1926 was \$8,554.05 and that in 1925 was \$8,348.45. The difference is \$205.60 in favor of black powder.

Additional labor is required during the five wet

months, between the middle of November and the middle of April. Using L. O. X. the additional labor plus the cost of operating the dinky engine would amount to over \$200 per month. In the table given in the paper only half of one wet month is included, whereas in a whole year's operation there would be five wet months.

To average up costs for these we should add at least \$500 to the labor bill when L. O. X. is used. Therefore, for an entire year, labor costs for black blasting powder would be \$700 less than for L. O. X.

Mr. Holderer states that the crew quickly became expert in handling the L. O. X. cartridges; he does not say what, if anything, was done to make the shooting crew thoroughly proficient in handling black blasting powder during the preceding year. Under the close supervision of experts it is probable that equal efficiency in loading could have been attained in 1925.

On work of this kind occasional ragged holes are encountered, and when loading them with cartridges, considerable time is required to make sure that the explosive charge is properly placed. I have seen instances where an hour or more was

required for loading holes of this kind. The paper contains no information on what is done under such circumstances with L. O. X. cartridges, which rapidly lose strength as the liquid oxygen evaporates.

Mr. Holderer says that the L. O. X. shattered the ground much better than the black powder. The closer spacing of the holes and column loading of the L. O. X. as compared to pocket loading of the black blasting powder, the method previously followed, is responsible for at least a part of any difference noticed. Herco-blasting, which consists of column loading black blasting powder and firing it with cordeau, would probably have given much better results than were obtained from pocket loading of the same explosive.

In Table 3, of Mr. Holderer's paper, the following comparison of explosives' costs is given: Black blasting powder in 1925, \$56,395.92; L. O. X. in 1926, \$46,525.37; giving a difference of \$9,870.55.

This difference appears impressive, but when all items of actual cost for L. O. X. are included, a different picture is presented.

The cost of manufacturing L. O. X. in October is given as \$4,149.44. According to Table 3 the cost of L. O. X., including cordeau and electric blasting caps was \$5,469.76. By again referring to Table 1, we find that 31,532 ft. was drilled in 940 holes, therefore, ap-

At the February meeting of the American Institute of Mining and Metallurgical Engineers, George B. Holderer presented a paper on the use of liquid oxygen explosive in strip pit mining, an abstract of which appeared in *Coal Age* of April 7, p. 497. Immediately after its presentation J. Barab of the Hercules Powder Co., of Wilmington, Del., discussed this paper at some length, as here reproduced.

proximately 32,500 ft. of cordeau and 940 electric blasting caps were required. The cost of these two items is just about \$1,320, or the difference between \$4,149.44, the cost of labor, power and supplies for manufacturing L. O. X. in October and \$5,469.76, the total explosives cost for that month (Oct., 1926) given in Table 3.

It is, therefore, apparent that in all of the above figures for costs of L. O. X., depreciation of plant and interest on investment were not included. We may reasonably assume that the cost of the L. O. X. plant and its installation, plus the cost of the cartridge-filling machine and other appurtenances required, is \$65,000. A conservative figure for depreciation and obsolescence is 10 per cent, or \$6,500. Interest on the investment at 5 per cent is \$3,250. The total for twelve months would therefore be \$9,750. For the seven months' period upon which the figures previously given are based, depreciation, interest and obsolescence would be \$5,687.50, which must properly be included in the cost of L. O. X.

Figuring in the cost of extra drilling necessitated by the use of L. O. X. as well as depreciation, interest and obsolescence of plant, items which Mr. Holderer has omitted, the comparative costs for 1925 and 1926 are as follows:

	1925 Black Blasting Powder	1926 L. O. X.
Drilling 127,596 ft. at 25c..	\$31,899.00	.....
Drilling 202,945 ft. at 25c..	.....	\$50,736.25
Explosives	56,395.92	46,525.37
Interest, depreciation and obsolescence of plant....	.....	5,687.50
Labor	8,348.45	8,554.05
Labor, extra for winter....	.....	500.00
	<hr/>	<hr/>
	\$96,643.37	\$112,003.17
Difference in favor of black blasting powder .....	.....	96,643.37
		<hr/>
		\$15,359.80

The comparison shows that the cost of drilling and blasting, for L. O. X. in 1926, including labor, was actually \$15,359.80 greater than with black blasting powder for 1925.

In stripping operations, explosives are used exclusively for blasting the overburden. Therefore, in order to compare various methods of drilling and blasting, both in efficiency and economy, the only equitable basis for such a comparison is the cost to remove equal volumes of overburden. Statements that the digging is easier when L. O. X. is used are only a matter of opinion unless they are substantiated by actual figures. By referring to Table 5, the following yardages are obtained for overburden removed:

	1925 Cu.Yd.	1926 Cu.Yd.
Pit No. 1.....	560,935	555,642
Pit No. 2.....	730,459	558,172
Pit No. 3.....	436,371	516,736
Pit No. 4.....	711,284	825,721
	<hr/>	<hr/>
	2,439,049	2,456,271

Comparative costs of removing equal volumes of overburden may be arrived at as follows:

$$\frac{\$96,643.37 \times 1,000}{2,439,049} = \$39.62 \text{ or the cost of removing } 1,000 \text{ cu.yd. when black powder was used}$$

$$\frac{\$112,003.17 \times 1,000}{2,456,271} = \$45.43 \text{ or the cost of removing } 1,000 \text{ cu.yd. when L. O. X. was used}$$

It is, therefore, obvious that when all items are in-

cluded and using the figures given by Mr. Holderer, it actually cost \$6 a thousand cubic yards more to blast the overburden with L. O. X. than it did when black powder was employed.

Mr. Holderer estimates that 50,000 tons more coal was mined in 1926 than in 1925, and that this increase in tonnage is the direct result of the greater ease with which stripping operations have been conducted, which he attributes to the use of L. O. X. It is difficult to reconcile such a conclusion with the facts given in his paper. If more coal was obtained by removing an equivalent yardage of overburden it simply indicates that the proportion of overburden to coal obtained was lower; this point has no bearing upon the relative effectiveness of the explosives used.

REBUTS DELAYED UNLOADING HAZARD

The fact that cars of black blasting powder were sometimes permitted to remain at the tippie for two or three days before being unloaded is referred to by Mr. Holderer as a special hazard. This hazard would not have existed had the cars been unloaded promptly, in accordance with good practice. Mr. Holderer says further that a comparatively large number of men come in contact with blasting powder or have occasion to be near it while it is being handled and transported daily, thus increasing the hazard to life and property. Transporting small quantities of L. O. X. at frequent intervals is an equal, if not a greater hazard.

I disagree with Mr. Holderer's assertion that there is no danger of L. O. X. cartridges exploding from an accidental spark from a shovel or dinky. Under confinement this material is just as likely to explode, if not more so, than other explosives under similar conditions. Black blasting powder is handled in metal cans which certainly offer protection against sparks, while L. O. X. is exposed directly to them so that serious fires or explosions are more likely to occur.

To sum up, an additional expenditure of \$18,837.25 was required for the added drilling necessitated by the use of L. O. X. In 1925, with black powder an average of 528 cu. yd. of overburden was removed for each hole drilled; in 1926 using L. O. X. the average was only 370 cu.yd. The use of L. O. X. has, therefore, increased rather than decreased labor costs.

Since an almost equal amount of overburden was removed in 1925 when black blasting powder was used as during the corresponding period in 1926, when L. O. X. was employed, assuming that the ratio of overburden to the coal was the same in each instance, just as much coal could have been mined and shipped in 1925 as in 1926, had the mining company taken the necessary steps to accomplish this result. However, such a comparison has no bearing upon the subject considered in the paper.

The hazards introduced by using L. O. X. are equal to, if not greater than, those involved in the storage, transportation, and use of black blasting powder.

To the cost of L. O. X., as given in the paper, there should be added a fair charge for depreciation of plant as well as for interest on investment, neither of which have been there included; also the cost of the increased drilling required. When this is done, instead of effecting the claimed saving of about \$10,000 on explosives, the use of L. O. X., when compared to the cost of black powder during a corresponding period, actually shows a loss of more than \$15,000.

Current Prices of Mining Supplies

SINCE LAST MONTH

TRACK materials developed greater tendencies to fluctuate during the last four weeks, than did any other single group under the head of mining supplies. Railway ties are higher in Western centers; standard section angle bars or fish plates also advanced, base Pittsburgh. Prices are up about $\frac{1}{2}$ c. per lb., base, on copper wire. Feeder cable, No. 14 solid, two cond., declined \$1 per M. ft., compared with the April quotation. Scrap metals of all descriptions are appreciably lower than a month ago.

STEEL RAILS—The following quotations are per ton f.o.b. in carload or larger lots:

	Pittsburgh			
	Current	Year Ago	One	Chicago
Standard Bessemer rails.....	\$43.00	\$43.00	\$43.00	\$43.00
Standard openhearth rails.....	43.00	43.00	43.00	43.00
Light rails, 12 to 14 lb.....	36.00	35.00	34@36	1.80@1.90*

*Per 100 lb.

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh mill for carload lots, together with warehouse prices at the places named:

	Pittsburgh			
	Current	Year Ago	Chicago	Birmingham
Standard spikes, $\frac{1}{2}$ -in. and larger.....	\$2.80@2.90	\$2.80	\$3.55	\$3.00
Track bolts.....	3.90@4.25	3.90@4.15	4.55	3.90
Standard section angle bars, splice bars or fish plates	2.85	2.75	3.40	....

WROUGHT STEEL AND IRON PIPE—The following percentage discount are to jobbers for carload lots at Pittsburgh mill:

		Butt Weld			
Inches	Black	Galv.	Inches	Black	Galv.
1 to 3.....	62	50 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	30	13
LAP WELD					
2.....	55	43 $\frac{1}{2}$	2.....	23	7
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
1 to 1 $\frac{1}{2}$	60	49 $\frac{1}{2}$	1 to 1 $\frac{1}{2}$	30	14
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2.....	53	42 $\frac{1}{2}$	2.....	23	9

WROUGHT STEEL PIPE—From warehouses at the places named the following discounts hold for welded steel pipe:

	Black		
	New York	Chicago	St. Louis
1 to 3 in. butt welded.....	53%	54%	49%
2 $\frac{1}{2}$ to 6 in. lap welded.....	48%	51%	46%
	Galvanized		
	New York	Chicago	St. Louis
1 to 3 in. butt welded.....	39%	41%	36%
2 $\frac{1}{2}$ to 6 in. lap welded.....	35%	38%	33%

Malleable fittings, Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard sizes, 36—5% off.

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York			
	Birmingham	Burlington, N. J.	Current	One Year Ago
4 in.....	\$42.00	\$50.00	\$52.60	\$55.60@57.60
6 in. and over.....	38.00	46.00	48.60	51.60@53.60
	Pittsburgh	Chicago	St. Louis	San Francisco
4 in.....	\$49.60	\$50.20	\$47.60	\$60.00
6 in. and over.....	45.60	46.20	43.60	56.00

Gas pipe and Class "A," \$4 per ton extra.

BOLTS AND NUTS—Discounts from new list, Apr. 1, 1927, on immediate deliveries from warehouse in New York and vicinity: Machine bolts, square heads and nuts, up to 1x30-in., full kegs or cases, 50%; Carriage bolts, up to 1x6-in., broken kegs or cases, 50—10%; Nuts, hot-pressed or cold-punched, blank or tapped, square or hexagonal, full kegs or cases, 50—10%.

STEEL PLATES—Following are base prices per 100 lb. in carload lots, f.o.b., for 1-in. thick and heavier:

Pittsburgh.....	\$1.80@1.90	Birmingham.....	\$1.95
-----------------	-------------	-----------------	--------

STRUCTURAL RIVETS—The following quotations are per 100 lb., in carload lots, f.o.b. mill, for 1-in.:

Pittsburgh.....	\$2.75	Cleveland.....	\$2.75	Chicago.....	\$2.85
-----------------	--------	----------------	--------	--------------	--------

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized, in New York and territory east of Missouri River:

	Per Cent
Flow steel round strand rope.....	35
Special steel round strand rope.....	30
Cast steel round strand rope.....	20
Round strand iron and iron tiller.....	5
Galvanized steel rigging and guy rope.....	7 $\frac{1}{2}$
Galvanized iron rigging and guy rope.....	+12 $\frac{1}{2}$

RAIL BONDS—28-in., 0000, stranded copper, welded, at points east of the Mississippi per 100, \$90.36.

DRILL ROD—Discounts from list:

New York.....	60%	Cleveland.....	55%	Chicago.....	50%
---------------	-----	----------------	-----	--------------	-----

FRICTION TAPE—Size 1-in. in 100 lb. lots in Eastern territory, per lb., \$0.31.

RAILWAY TIES—For fair-sized orders, the following prices per tie hold.

	6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8 $\frac{1}{2}$ Ft.
Chicago, white oak, plain.....	\$1.45	\$1.83
Chicago, empty cell creosoted.....	1.85	2.45
Chicago, zinc treated.....	1.65	2.15
St. Louis, white oak, plain.....	1.25	1.50
St. Louis, zinc treated.....	1.65	1.90
St. Louis, red oak, plain.....	1.15	1.25
Birmingham, white oak.....	1.25	1.45

STEEL MINE TIES—Prices range from \$0.38 to \$0.60 per tie, f-o-b. Pennsylvania and West Virginia Districts, depending upon gage of track and weight of rail.

CALCIUM CARBIDE—In drums, f.o.b. producing point, per lb., \$0.05 $\frac{1}{2}$ @\$0.06.

BRATTICE CLOTH—Prices f.o.b. cars New York, Philadelphia, St. Louis or Chicago, per sq. yd.:

Jute, 24-oz., double warp.....	\$0.22	Jute, waterproof.....	\$0.24
Jute, 22-oz.....	.17	Duck, waterproof.....	.35
Jute, 18-oz.....	.15	Duck, non-inflammable.....	.32
Old sail cloth.....	.55		

COTTON WASTE—The following prices are in cents per lb.:

	New York	Cleveland	Chicago
White.....	10.00@13.50	16.00	15.00@20.00
Colored.....	9.00@13.00	12.00	12.00@17.00

MACHINE OIL—Medium bodied, in 55 gal. metal barrels, per gal., as follows:

New York.....	\$0.33	Cleveland.....	\$0.35	Chicago.....	\$0.29
---------------	--------	----------------	--------	--------------	--------

SCRAP IRON AND STEEL—The prices following are f.o.b. per net ton paid by dealers:

	New York*	Chicago	Birmingham
No. 1 railroad wrought.....	\$12.00@12.50	\$12.00@12.50	\$12.00@13.00
Stove plate.....	8.00@ 8.50	13.00@ 13.50	14.00@ 14.50
No. 1 machinery cast.....	15.00@ 16.00	16.00@ 16.50	17.00@ 17.50
Machine shop turnings.....	7.00@ 8.00	6.50@ 7.00	8.00@ 8.50
Cast borings.....	7.50@ 8.00	9.50@ 10.00	8.00@ 9.00
Railroad malleable.....	11.25@ 11.75	13.00@ 13.50	16.00@ 17.00
Re-rolling rails.....	11.50@ 12.00	13.75@ 14.25	15.00@ 16.00
Re-laying rails.....	23.00@ 24.00		21.00@ 22.00
Heavy melting steel.....	7.75@ 8.00	11.50@ 12.00	12.90@ 12.25

* Gross ton.

SCRAP COPPER AND BRASS—Dealers' purchasing prices in cents per lb.:

	New York	Cleveland	Chicago
Crucible heavy copper.....	\$11.37 $\frac{1}{2}$ @11.62 $\frac{1}{2}$	10.75	10.25@ 10.75
Copper, heavy, and wire.....	10.62 $\frac{1}{2}$ @ 11.87 $\frac{1}{2}$	11.00	9.50@ 10.00
Copper, light, and bottoms.....	9.12 $\frac{1}{2}$ @ 9.62 $\frac{1}{2}$	9.50	8.50@ 9.00
Brass, heavy, yellow.....	7.25@ 7.50	7.50	6.50@ 7.00
Brass, heavy, red.....	9.00@ 9.25	9.50	8.75@ 9.25
Brass, light.....	5.50@ 5.75	6.00	5.75@ 6.25
No. 1 yellow rod turnings..	7.50 @ 7.75	7.50	6.75@ 7.25

COPPER WIRE—Prices of bare wire, base, at warehouse, in cents per lb. are as follows:

New York.....	18.62 $\frac{1}{2}$	Cleveland.....	18.37 $\frac{1}{2}$	Chicago.....	18.50
---------------	---------------------	----------------	---------------------	--------------	-------

TROLLEY WIRE—In carload lots, f.o.b., producing point, all sizes, round, 15c. per lb.; grooved, 15c.; Fig. 8, 16c.

TROLLEY WHEELS—F.o.b. Jersey City, N. J., 4-in., \$1.20 each; 6-in., \$1.50 each.

MINING MACHINE CABLE—F.o.b. producing point, rope lay patterns, single conductor, per M. ft.:

	Braided	All Rubber Covered
Size 2.....	\$105.80	\$208.00
Size 3.....	74.50	188.70
Size 4.....	65.70	174.00

LOCOMOTIVE CABLE—F.o.b. producing point, braided, Size 3, \$83.00 per M. ft.; Size 4, \$69.00 per M. ft.

FEEDER CABLE—Price per M. ft. in larger buying centers east of the Mississippi

B. & S. Size	Two Conductor	Three Conductor
No. 14 solid.....	\$30.00 (net)	\$50.00 (net)
No. 12 solid.....	136.00	180.00
No. 10 solid.....	185.00	235.00
No. 8 stranded.....	305.00	375.00
No. 6 stranded.....	440.00	530.00

From the above lists discounts are: Less than coil lots, 50%; Coils to 1,000 ft., 60%; 1,000 to 5,000 ft., 62%; 5,000 ft. and over, 65%.

EXPLOSIVES—F.o.b. in carload lots:

	West Virginia	Districts	Missouri
Black Powder, FF, NaNO ₂ base, 800 kegs per car, per 25 lb. keg.....	\$1.70@1.80	Pennsylvania	\$1.75
Ammonium permissible, 1 $\frac{1}{2}$ x 8 in. sticks, 20,000 lb. per car, per 100 lb.....	14.50@15.50	14.25	14.50

Safety Hoist Brake of New Type Has Many Advantages

Some Old-Fashioned Safety Brakes Instead of Protecting the Hoists Are Actually a Source of Danger — The Free-Fall Brake Here Described Eliminates Braking-Pressure Shocks

By C. H. S. Tupholme
London, England

MUCH PROGRESS is being made in hoisting-engine practice and design in Great Britain. One item that is receiving particular attention is the improvement of various safety devices (including different types of brakes) now in use. The ideal safety brake is one that will automatically bring the machine to rest (in the least possible time) when any unusual occurrence, such as overwinding of the cage, excessive hoisting speed, overloading, or the like takes place. Stoppage must be effected without undue stress upon either the engine or the rope; without occasioning rope slip where Koepe pulleys are in use; and without causing injury to men who may be in the cages. The usual old-fashioned drop weight only partially meets these requirements with the result that some safety brakes, instead of protecting the hoists upon which they are installed, are actually a source of danger.

In the common type of drop-weight brake, the weight is rigidly fixed to the brake rod. If the brake weight were allowed to fall entirely free, the cages could be stopped within a short distance. However, the shocks resulting from such practice would occasion dangerous stresses inasmuch as the moment that the brake blocks touch the rim, the velocity of the weight is almost instantly reduced to zero. The kinetic energy, that has been accumulating during the unrestrained descent of the brake weight, also produces a tensile stress in the rod which may attain unsafe proportions. This is due to the slight extensibility of the rod and, therefore, to the extremely small distance in which the kinetic energy must be dissipated. Immediately following the slight extension, the contraction of the rod causes the brake weight to rebound slightly. This cycle is repeated until the kinetic energy of the weight has been entirely absorbed.

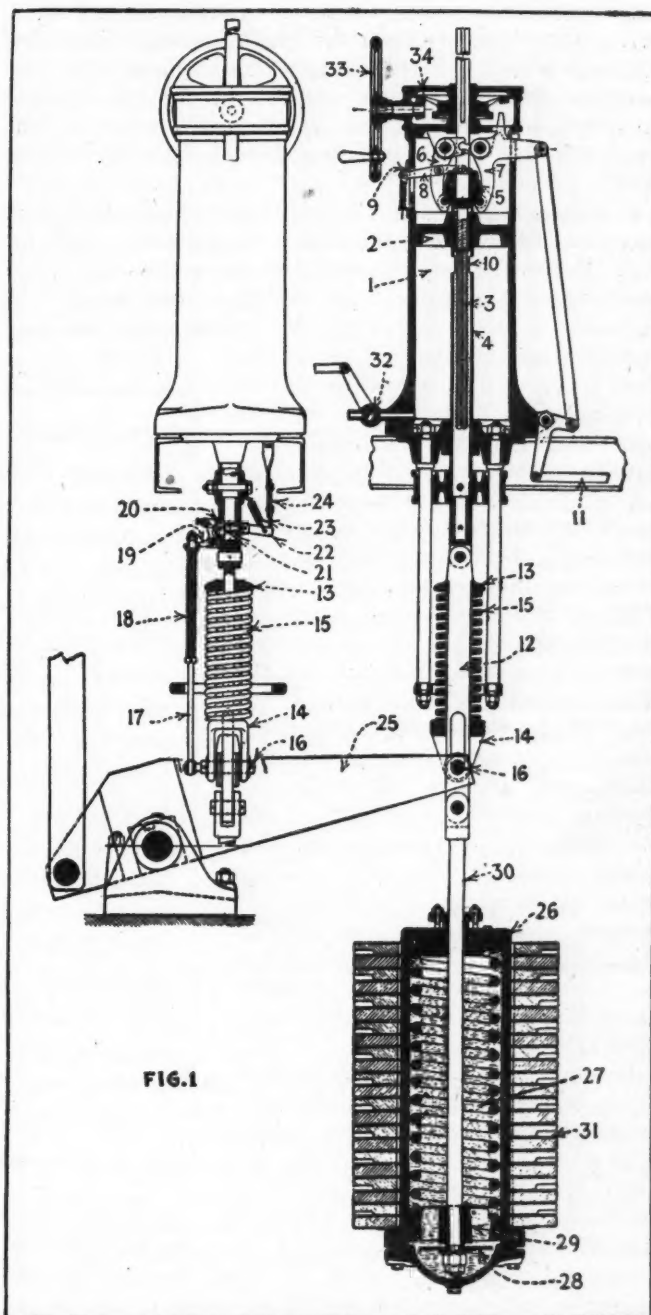


FIG. 1

Brown Boveri Safety Brake

As explained in the accompanying article, the actuating weight falls entirely free up to the moment that the brake blocks meet the brake rim. The hoist is brought to rest as quickly with this device as with one of the drop-weight type but all shocks and stresses are avoided.

To determine what actually occurs in practice, exhaustive tests were made on a Koepe-pulley hoist designed to raise a net load of 8,800 lb. from a depth of 1,640 ft. at a speed of about 1,800 ft. per min. Pres-

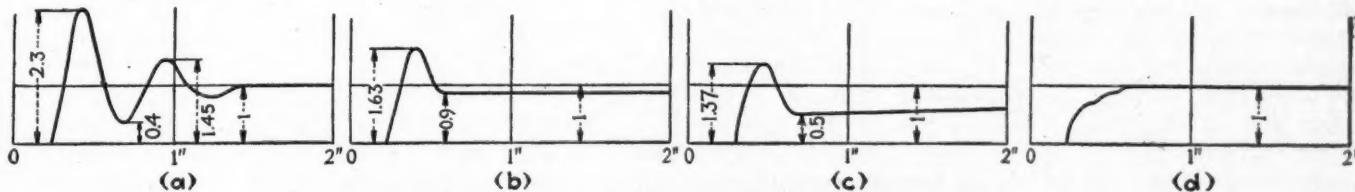


Fig. 2—Pressure Diagrams from Hoist Safety Brakes

These curves were obtained during tests made on a Koepe-pulley hoist raising a load of 8,800 lb. from a depth of 1,640 ft. at a speed of about 1,800 ft. per min. The diagrams were taken with a braking-pressure indicator and, in each, the normal final pressure is taken as unity. Curve (a) was obtained with the air release fully

opened. In this case the duration of braking time was 7.3 sec. and the braking distance 107.6 ft. The air release was only 20 per cent open in diagram (b), the time of braking was 9 sec. and the distance 132.8 ft. In this case, normal final pressure was attained in about 3 sec. Curve (c) represents the results obtained with

the air release 5 per cent open. Here the braking time was 16.8 sec., the distance 247.8 ft. and normal final pressure was not attained for about 14 sec. Diagram (d) was given by a free-fall safety brake. The braking distance was 110.9 ft. and the time of braking 7.5 sec. Note the freedom from pressure "surges" and shocks.

sure curves were taken with an indicator. In Fig. 2 (a), (b), (c) and (d) show the brake-pressure diagrams obtained when the safety brake was released with the machine operating at full speed. In (a) to (c) the usual type of drop-weight was employed, whereas (d) was obtained from a Brown Boveri free-fall safety brake.

Pressure diagram, Fig. 2 (a), clearly shows the heavy shock produced when the brake blocks first meet the rim. It also indicates the subsequent oscillations which occur in the braking pressure before this reaches a uniform final value. The braking pressure will be even greater when, in place of the brake-block travel of 0.12 in. used in the experiments, the higher values (due to brake-block wear) which usually obtain in practice are employed. In the latter case, the distance through which the weight drops is greater and, hence, also the amount of kinetic energy accumulated during its fall.

When the drop-weight type of safety brake is used, it becomes necessary to dampen the fall of the brake weight. This reduces the speed of the weight the moment the brake blocks make contact with the wheel rim, thereby lessening the shock of braking. In Fig. 2, (b) and (c) show the brake-pressure diagrams obtained with different degrees of damping. Although the stresses produced are decreased by this method, it has the disadvantage of increasing the distance through which the cages continue to travel after the brake is applied.

To overcome these disadvantages, a free-fall safety brake has been perfected, the principal feature of which is that the brake weight falls, entirely free, up to the moment that the brake blocks meet the wheel rim. It is not until then that the weight is retarded, by a special damping device, in such a way that the force exerted by the weight is transmitted without shock to the brake blocks.

This brake is shown in section in Fig. 1. The brake-weight supporting rod, 12, is rigidly connected to the hollow piston rod, 4, and this, in turn, with the piston, 2. The latter is made in the form of a nut in which the lifting-gear spindle, 3, can turn. The spindle is supported by the collar bearing, 5, which is beveled on its under surface and rests upon two roller-tipped pawls, 6 and 7. When the brake is lifted, these pawls are held in position by the electromagnet mounted on the operating stand. The brake weight, 31, is supported upon the weight buffer, 26-30, which is attached to the brake-weight supporting rod, 12. The latter is attached to the brake lever through the compression spring, 15. The upper end of this spring presses against the brake-weight supporting rod, and the lower end rests on the brake lever. The interior of the cylinder is open to the atmosphere through the holes, 10, in the hollow piston rod, and through the valve, 20. In the upper portion of the safety brake, a hand-operated lifting device is also mounted. This will be described later.

The brake-weight buffer consists of the closed cylinder, 26, which is filled with oil; the piston rod, 30;

the piston, 29, provided with a valve, 28; and a spring which is interposed between the piston and the upper part of the cylinder.

In operation, the brake weight is released when, for example, the circuit of the electromagnet previously mentioned is interrupted by the functioning of one of the safety devices (overwind switch, centrifugal switch, etc.). As soon as the magnet ceases to exert its force on the rod, 11, the pawls, 6 and 7, are separated by the pressure of the drop weight acting on the beveled seat of the collar bearing, 5. The pawls are then held in the open position by the catch, 9. The whole system now falls entirely without damping as the air in the cylinder can freely escape through the opening, 10, in the hollow shaft, and through the spring-operated valve, 20.

The instant the brake blocks meet the drum, the lever, 25, is brought to rest. However, the brake weight and the supporting rod continue to move and compress the spring, 15. At the same time the valve, 20, has been closed to such an extent by the rod, 17, that only an extremely small opening is left. The rod, 17, is connected to the brake lever and is, therefore, also brought to rest. When this has occurred, only a slight further motion of the piston is necessary to take up the additional pressure resulting from the retardation of the falling brake weight.

At the same time that the compressed air is escaping through the throttled valve, 20, the brake-weight pressure, now partially carried on the air cushion, is transferred (without shock by means of the spring, 15), to the brake lever. Not until the air under the piston has again reached atmospheric pressure does the com-

pression of the spring correspond to the full force of the brake weight. Only then is the maximum braking pressure attained.

The gradual arrest of the brake weight, after the blocks have come in contact with the rim, is effected by means of the weight buffer previously mentioned. This absorbs the kinetic energy of the brake weight by compressing the spring, 27. The re-extension of this spring is opposed by the action of a liquid cataract in such a way that the expansion takes place without reacting on the braking pressure and, therefore, no vibratory shocks are imposed upon the brake lever. As the cylinder, 26, moves upward, the work stored up in the spring, 27, is dissipated in overcoming the resistance of eddy currents set up in the oil as it passes through the nearly-closed valve, 28.

Fig. 2 (d) shows the pressure diagram obtained from this safety brake. The machine was brought to rest just as quickly as in Fig. 2 (a), (b) and (c) but, as will be seen, this Brown-Boveri brake eliminates violent fluctuations in the braking pressure. The brake-weight pressure is transferred to the brake blocks in such a way that it is gradually built up from zero to a maximum.

The conical shape of the under surface of the collar bearing, 5, is advantageous in that the brake weight

Engineers in Great Britain are devoting much attention to hoisting-engine practice and design, particularly to safety brakes. With the usual type of drop-weight brake it is necessary to dampen the fall of the weight if undue stresses and shocks on the hoisting-machinery are to be avoided. This necessarily increases the braking distance. Although quick-acting and positive, the recently-perfected brake described in the accompanying article acts in such a manner that the braking pressure is gradually built up from zero to a maximum.

tends to release itself and drop the moment that the electromagnetic circuit is broken. Extremely rapid and reliable operation is thus secured. Because of the conical under surface of the collar bearing, the pawls cannot remain jammed. Withdrawal of the armature of the magnet, by means of a lever provided for the purpose, permits the safety brake to be released by hand at any time.

Resetting of the brake is accomplished either by compressed air or by hand. In the first method, the cock, 32, is opened and compressed air permitted to act on the piston. The entire system is raised until the supporting collar strikes the lever, 8. This releases the catch, 9, and allows the pawls to again engage the collar bearing. On closing the cock, 32, the compressed air in the cylinder escapes through the valve, 20. This valve was kept closed, while the piston was rising, by the action of the spring, 23, and was not again opened until the lever, 22, struck the finger, 24. Therefore, if the brake be again released the weight can once more fall entirely free; i.e., without damping.

HOW RAISING BY HAND IS DONE

To raise the brake weight by hand, the spindle, 3, is first drawn up by means of the hand wheel, 33, and the pair of bevel gears, 34. During this operation the piston, piston rod and brake weight still remain in the lower position. Assuming that the cause of release has been removed in the meantime, the magnet will then again actuate the pawls, 6 and 7, and thereby cause the latter to support the spindle in its upper position. Therefore, when the handwheel is turned in the opposite direction the piston and brake weight can be drawn up the spindle (now held in the upper position) until the brake is completely raised.

The brake weight can be raised only when the holding magnet is again excited, i.e., if the cause of release has been removed. Another important feature is the fact that automatic release of the brake weight can always take place, even during the resetting of the brake.

One advantage of raising the brake weight by hand is that such a procedure permits loads to be lowered at any desired speed by means of the safety brake alone. The braking force can be nicely regulated because of the resilient connection between the brake-weight supporting rod and the brake lever. In this way it is possible to lower a load gently and with absolute certainty and security.

"Stepping Up" Current Makes Feasible Unlimited Economic Transmission

The patents issued to Frank C. Baum, an electrical engineer of San Francisco, have been recently acquired by the Westinghouse Elec. & Mfg. Co. Mr. Baum's invention is said to make possible the economic transmission of electric current over unlimited distances by "stepping up" the current at points where it begins to lag. Speaking of the acquisition of the patent rights of this process, W. S. Rugg, vice-president in charge of engineering of the Westinghouse company, said: "Mr. Baum's invention eliminates one of the difficulties that has seriously embarrassed electrical engineers in recent construction of superpower systems. For example, it is entirely feasible to transmit large quantities of power over a simple set of wires for distances of about 100 miles. However, were it attempted to trans-

mit current 500 miles, the voltage conditions would become so erratic as to make the line inoperative.

"Effects of this kind may be controlled to a certain extent by means familiar to all electrical engineers. However, Mr. Baum's invention provides a method far more efficacious in imparting stability to long-distance transmission lines than any other known device. Through its use, the capacity of a long line may be increased 75 per cent at a cost that does not exceed 20 per cent of the original cost of the line.

"It will make possible the economical transmission of power from distant waterfalls and ultimately will provide electricity in sparsely settled districts practically anywhere in the United States."

MAKES TRANSCONTINENTAL SYSTEM POSSIBLE

Regarding his invention, Mr. Baum said: "From a theoretical point of view my invention makes a transcontinental power system entirely feasible. However, such a system will certainly never be built because it would be economically unjustified. The longest lines transmitting power directly that will in all probability ever be built in the United States are those that may some day bring power from the Rockies to the Mississippi Valley. Such lines might be from 500 to 1,000 miles long and would be entirely practicable from an engineering standpoint when my method is used.

"My invention covers the connection of a plurality of automatically regulated synchronous condensers, at substantially uniformly spaced points, directly to the high-voltage transmission lines. The practical effect of such a procedure is to transform the long lines into a series of relatively short lines in each of which the factors that have a tendency to cause instability can readily be controlled.

"By dividing the transmission line into relatively short sections, say 100-mile lengths, and supplying a corrective current, such as a charging current under light-load conditions, to the line from a synchronous condenser located at each of such points, a substantially constant potential is maintained throughout the length of the line. Power may be supplied or received at any of these points with a minimum of additional generating or distributing apparatus."

Long-Distance Gas Pipe-Line Service Is Proposed in Germany

The coke plants of Germany produce 495,000,000,000 cu.ft. of gas per annum. The production at the gas plants amounts to about 105,000,000 cu.ft. annually. To promote a better utilization of these resources, a long-distance gas pipe-line service is under consideration. It is first planned to inaugurate a service tracing the following routes: Ruhr-Berlin; Ruhr-Coast; Ruhr-Cassel; Leipzig-Berlin; Leipzig-Cassel; Silesia-Berlin; Silesia-Saxony; Central Germany-Munich; and Cologne-Mannheim-Stuttgart. The total length of this system is about 1,700 miles. The shortest distance is from Leipzig to Berlin, a distance of approximately 90 miles, and the longest branch is from the Ruhr district to Berlin, a distance of about 285 miles.

This service promises not only to utilize gas that might otherwise be wasted, but also to furnish the consumer with cheaper gas than he can obtain from plants in his immediate vicinity.

Men and Women of the Mines VIII—Rules and Regulations

By H. S. Geisner
Birmingham, Ala.

Following an explosion at B-B, the company management called for a thorough investigation and found that failure to enforce the company and state rules regarding the storage of explosives in working places was the indirect cause of the catastrophe. The general manager called a meeting of all of the company superintendents and a reign of "enforce all rules and regulations" was inaugurated.

Orders were placed by the general office for large placards having all of the rules and regulations printed on a single sheet suitable for mounting on bulletin boards; booklets containing all of the rules and regulations, small enough to be carried in a jumper pocket, and in quantities sufficient to furnish every employee a copy; metal signs in several languages, some saying "do" and some saying "don't;" additional bulletin boards, attractive in appearance, one style for commissary entrances, another for mine entrances, and still another for the pay windows.

In the matter of carrying out the G. M.'s instructions covering erection of bulletin boards, tacking up of metal signs, and distributing literature, there was uniformity of action at all of the mines as no questions were raised calling for individual interpretation by local superintendents. But the G. M. had dug up, out of his letter files and had read at the meeting, many rules and regulations that had been promulgated previously over a period of years, all of which were supposed to be still in effect. In trying to get those rules and regulations again into effect the superintendents at the various mines resorted to widely different methods partly because they construed them differently and partly because they had different ways of doing things.

A FOOLISH SEEKER AFTER DEFERENCE

One of the company superintendents who had come up to his position through the ranks saw in this urge of the management to enforce rules and regulations, an opportunity to obtain from his employees the deference to his position that he had always hoped for but somehow had never been able to obtain. When he got back to his office he spent several days working up a schedule and dictating letters of instructions to his various assistants. Before sending them out he had a partition erected in his office dividing it into two rooms. In the outer room he stationed one of the timekeepers and instructed him to admit no one to the super's sanctum without first finding out if the visitor's presence was desired.

Then he had a notice placed on the office door carrying the information that the superintendent would grant audience to out-of-town visitors on Tuesdays and Fridays only; he would confer with his assistants stationed above ground each day from four to five and with his assistants having duties underground from five to six; all complaints from wives of workers would receive consideration on Mondays and Wednesdays during the hours from two to four, and complaints from workers who thought they were being mistreated would be given consideration only on Saturdays just before the arrival of the paymaster. News of the "Super's posted orders" spread rapidly and on the evening of that same day as

the men came from the mines they hurried over to his office in order that they might see them with their own eyes.

The "super" came out to hear their comments. He remained long enough to hear one man, with his back toward him, ask if any blankety blank blank imagined that fires or strikes or explosions could be expected to occur at scheduled times to suit the superintendent's hours.

North Dakota to Have Briquet Plant Of 200 Tons Daily Capacity

As recently reported in *Coal Age*, two German scientists, Drs. F. A. Oetken and Frank Mueller, at the instance of Minneapolis financiers, are visiting the Northwest to investigate the possibility of the lignite deposits of North and South Dakota and Montana. Although experiments looking to the utilization of the practically limitless deposits of lignite in this section of the country have been carried on for several years, the actual success of these attempts to date has not been marked. However, it is the intention to employ a process recently perfected in Germany and to this end a company is being formed to build a briquetting plant at Lehigh, N. D., with a daily capacity of 200 tons. The Lehigh Briquetting Co. controls more than 32,000,000 tons of lignite and, because the deposits lie close to the surface, the material will be mined by stripping.

In commenting on the lignite situation in the Northwest, Doctor Mueller said: "In Germany it is an accepted fact that lignite can be briquetted to form a satisfactory substitute for anthracite. Many plants for this purpose are being built in Germany and other European countries. From tests already made it is proved that the lignite of the Dakotas and Montana is superior to any yet discovered.

"The processing, at low cost, of lignite into a better fuel became a necessity for Germany after the war. That nation lost much of its best coal lands and search was started to discover a substitute fuel to keep her industries in operation. The present process, now satisfactorily worked out, was discovered about three years ago.

CARBONIZATION ENRICHES LIGNITE

"Under this process, the lignite with its high water content, is enriched through carbonization. The non-combustible gases and part of the water are removed, leaving a char or semi-coke which is briquetted. The lignite in Germany contains 50 per cent of water as compared with 40 per cent in the North Dakota lignite.

"Byproducts of lignite are pitch and oil. The pitch is used in producing briquets from the char. Lignite contains approximately 4,000 B.t.u. per pound and the briquets have a heating value of between 12,000 and 13,000 B.t.u. About two tons of lignite are required to make one ton of briquets. This new fuel can be used not only for heating houses but for industrial purposes as well. Thus, the Northwest will have an opportunity to develop its great resources with the raw material already available. The supply of lignite is virtually inexhaustible."

FILIBUSTERING SENATORS will have to improve. Frenchman has danced continuously for 266 hours.—*Wall Street Journal*.

Monopolism Creating Unemployment And Curtailing Production Deplored At Geneva as Cause of Europe's Ills*

By Dr. Karl Gustav Cassel

Professor, University of Stockholm, Sweden

First among the false ideas that hamper trade stands the idea that it would be advantageous to suppress other countries and to destroy their trade in order to make room for the trade of one's own country. Progress is only possible by the sincere collaboration of all nations working together.

Another false idea is that the general purchasing power of the world is too small for the world's actual production. The consequence of this view is of course that production must be curtailed.

Shall the collaboration be sought in agreements calculated to restrict output and reduce the world's real income or shall we try to unite all nations in the aim of increasing the world's production, making the world richer and supplying its population more fully with all that it needs for raising its standard of living?

The purchasing power of human society can never be anything else than the total produce of that society. If we believe that the total purchasing power of the present world is too small there can be no other remedy than an increase of the world's production. On the other hand if we should choose deliberately to reduce the world's total production and bring it down on a level with an assumed purchasing power the result would only be that the real purchasing power was reduced in the same proportion and that the world would be so much poorer.

Productive Powers Idle

The most characteristic feature of the European economic situation is the very incomplete use made of Europe's productive powers and particularly the wide-spread and long continued unemployment of its labor. This is not only an internal European interest. If Europe cannot find full employment for its magnificent productive capacity the rest of the world will be more scantily supplied with European goods and European services and at the same time will find European purchasing power inadequate.

The actual facts are these. The products of European industry are to a large extent too costly and therefore fail to find a sufficient market. On the other hand the monopolistic forces prevailing in many countries prevent the productive powers from moving to better occupations, with the result that industry experiences a great difficulty in keeping its works going and that labor suffers from an unemployment which in some countries has taken really alarming dimensions.

As we all know the post war development of international trade relations has been very unsatisfactory. Tariffs

have been raised and have been subjected to administrative alterations and a general state of insecurity has been created. We cannot of course hope immediately to come to a state of complete freedom of trade but we can abolish the most serious hindrances to an international exchange of goods.

Capital's Mobility Beneficial

The free movement of productive powers has been hindered in the case of labor, which has been hindered in its internal movements as well as in its movements between different countries but we can get an idea of what a freer mobility of productive forces means for the general economic welfare if we look upon the beneficent effects which have been the result of the comparatively free mobility of capital. In fact the international mobility of capital has been by far the most important factor in the recovery which, in spite of all difficulties, has already taken place.

The recent disturbed equilibrium of the world's economy is caused in part by dislocation of prices. The rise of prices since 1913 has been generally much greater for goods which are nearly ripe for consumption than for goods in the earlier stages of production.

The consequence is that the cost of living has risen since 1913 considerably more than the general wholesale prices. In fact the index cost of living is 171, whereas wholesale prices stand at 150.

To this general dislocation of prices corresponds a similar dislocation of wages. In those trades which have a distinct local market and which are naturally protected from outside competition trade unions have been able to raise their wages very much above the level prevalent in other and more competitive trades. Such a monopolistic situation is most easily created in the local building trades, in inland transport, in the works of local bodies, and, to a great extent, in the food-preparing industries. Action of this kind is always likely principally to affect the prices of highly manufactured goods, the cost of distribution to the consumers, and personal services. Such movement of wages must therefore always have the result that the cost of living increases in comparison with the general level of wholesale prices. For example, the cost of building material in Stockholm shows for December, 1926, an index figure of 186, which is already very much above the general index of wholesale prices, 150. The index for total building costs, however, is much higher, viz. 215, the explanation being that wages in building trades have reached an index of not less than 259.

This rise of the prices of consumers' goods of earlier stages of production is essentially a consequence of the particular increase in the costs of production in certain trades which has resulted

from the monopolistic influences of tariffs, of trusts and cartels, and of the locally protected trades unions.

This dislocation of prices has inevitably been to the disadvantage of certain classes of producers who have had to pay for advantages secured by other classes. It is clear enough that agriculture and, to a great extent, production of raw materials are among the chief sufferers. For their produce they get in exchange loss of manufactured goods and immediate service.

A similar alteration has taken place in the conditions for the exchange of goods between Europe and the colonial world. The main trend of development is a fall in the prices of colonial products as compared with those of the manufactured goods which Europe has to offer in exchange.

The colonial world now gets considerably less in exchange for its goods than it used to before the war. On the other hand Europe has difficulty in selling its products and suffers from a congested market and from unemployment. In fact Europe is like a manufacturer who keeps his prices too high and who is therefore obliged to store a part of his production. What Europe is storing, however, speaking broadly, is not goods but unemployed labor.

The development of agriculture and of the colonial world is, however, hampered by the reduction which has taken place in European savings and in Europe's capacity of putting fresh capital at the disposal of agriculture and of the colonial world.

Colonial Growth Checked

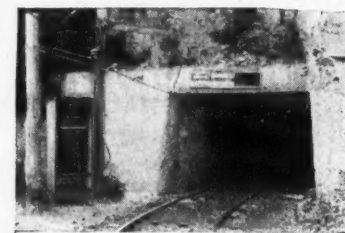
The result has been a general slowing down of colonial development. In this way the colonial world is suffering. But Europe is also suffering. First, Europe does not get the increased supply of colonial products of which it is in such great need for its increasing population. And second—and this is a point which deserves our most particular attention—when the colonial world cannot borrow money, those European industries which produce capital goods find their colonial markets restrained. That is why the depression in Europe is most strongly felt in the capital producing industries and therefore in England and in Germany.

We have now before us the main lines of the world's economic situation such as it presents itself in the light of a scientific analysis of the facts. It is easy to see what an unfortunate rôle monopolism in its various forms has played in the development of the deplorable situation. The serious and wide-spread dislocation of prices and wages which has taken place since the war and which has given rise to entirely abnormal unemployment is the great tangible result of the monopolistic tendencies of our day. However the responsibility for this unfortunate development may be divided, a situation in which Europe, by the aid of unemployment doles, is storing up industrial labor which is not allowed to perform useful work for the world's economy, while at the same time agriculture and colonial production suffer from an insufficient and too highly priced supply of industrial products, must be looked upon as the most emphatic expression of the fundamental fallacy of monopolism.

*This is an abstract made by E. J. Mehren, Vice-President and Editorial Director, McGraw-Hill Publishing Co., of an address delivered by Dr. Cassel before the International Economic Conference, Geneva, May 4, 1927.



News Of the Industry



Tentative Pact on Working Conditions In Southwest; Still at Odds on Wages; Peace Efforts at Standstill Elsewhere

Negotiations between the operators and the United Mine Workers in the Southwest have reached the stage of a tentative agreement upon working conditions. This agreement, approved at a general conference of the operators and miners at Kansas City, Mo., last week, provides for the incorporation in the new contract of "all decisions, agreements and rulings" formally made during the past three years by the Interstate Joint Commission for the Southwest, labor commissioners and district officers.

The subcommittee of operators and miners, which has been conducting the detailed negotiations since last March, will now take up the question of working out a satisfactory basic wage scale. Consideration of this question was postponed early in the course of the negotiations when the miners insisted upon the continuance of the Jacksonville rates and the operators countered with an offer to pay the 1917 scale. To avoid a deadlock at that time attention was turned to a consideration of working conditions.

Stalemate in Negotiations

Elsewhere in the unionized bituminous coal fields which ceased work on April 1, however, efforts to bring the representatives of the producing interests and the union together are at a standstill. Members of the Iowa Coal Operators' Association declare that they must have relief from the burdens of the Jacksonville basis, while officers of district 13 of the United Mine Workers are equally firm in their declarations that they will consider no reduction in wages.

George Heaps, Jr., president of the Iowa association, who was present at the meeting of the Coal Operators' Association of Illinois at St. Louis, Mo., last week, assured the Illinois producers that his organization was determined to hold out for a real modification in the contract. The few independent operations in Iowa which have made peace with the union produce so little coal, it was claimed, that their action can have no effect upon the general situation. On the other hand, co-operative mining has come under the ban of the district union.

Although there are some Illinois operators who believe that it would be better policy if an invitation were extended the miners to meet with the producers for a discussion without ad-

vance commitments on either side to any predetermined basis for settlement, this view is not entertained by the majority. Members of the latter group still feel that there must be concrete evidence of the abandonment of the Jacksonville scale idea by the miners before it would be wise to suggest a joint conference with the leaders of district 12. Until there is such evidence, they argue, such a suggestion would be interpreted by the miners as a sign of weakness on the part of the operators.

No official steps have been taken to set the machinery for joint conference in motion in Indiana since the collapse of the Terre Haute negotiations between the scale committees of the Indiana Bituminous Coal Operators' Association and district 11. The Ohio Coal Operators' Association, which invited the officers of district 6 to meet in joint conference on April 7 to discuss a continuously competitive scale, has made no overtures since that invitation was declined by Lee Hall, president of district 6.

Members of the Ohio association, at their weekly executive meeting held at Toledo, Ohio, last Friday, canvassed the situation and decided that there was nothing which could be done at this time. Leading Ohio operators are a unit in maintaining that nothing less than a scale which will enable them to compete with the mines south of the Ohio River can or will be accepted.

Break with Union Last Resort

Nevertheless non-union operation is looked upon by most of the producers in the Buckeye State as a last resort. There are some in the No. 8 district who contemplate the virtual abandonment of their mines in that field for the next ten or fifteen years. They believe their properties could be boarded up and the machinery moved across the river without any serious damage to the mines. Maintenance forces in many cases already have been reduced to skeleton crews of company men.

There are others in Ohio who hope that the demands of the workers themselves will force the union officials to modify their position and consent to the negotiation of a new wage contract upon a basis which would be satisfactory to the operators. It is their contention that the rank and file of the union membership appreciate the situation and that many of these men are

reconciled to a reduction in the basic rates of pay.

Union officials, of course, will not admit that this is a fact. They claim that the men are unalterably opposed to the continuously competitive scale plan because they believe that it would mean a steady downward movement in wages. District union leaders are busy holding meetings in various parts of the state to encourage the men to hold out. Last week a delegation from Ohio made a tour of the Pittsburgh district so that they might bring back personal word as to how the fight was progressing in that quarter.

Union Output Limited

Aside from a few small operations, local captive mines and country banks, there have been no Ohio producers willing to accept the union's terms. Moreover, the operators holding out for a competitive adjustment are convinced that there will be no desertions from their ranks. The tonnage from the mines working under the Jacksonville scale, they say, is insignificant. Most of the coal now being produced in Ohio is coming from the non-union operations in the Pomeroy Bend section and from the strip-pits in eastern Ohio which broke away from the United Mine Workers in 1922.

The Ohio Coal Operators' Association contemplates holding a meeting in Columbus about June 1 to take stock of conditions and develop a policy for the summer.

The Lick Run Coal & Clay Co. with a property at Nelsonville, in the Athens district, asked for an injunction May 11 against the United Mine Workers and its Ohio officials. More than fifty have been employed in the mine on an open-shop basis since Jan. 1. On May 11 Oril Daugherty, president of the Hocking district, induced eighteen to leave on the promise of union membership without charge. A temporary order restraining them from interfering with the operation was granted. Mass demonstrations have been made against the mine by strikers of the vicinity.

Although persistent efforts have been made to evict miners from houses owned by the Pittsburgh Terminal Coal Corporation in western Pennsylvania, those employed by the Cleveland & Western Coal Co. at Powhattan, Ohio, another Taplin interest, have not been disturbed. F. E. Taplin, president of the North American Coal Corporation, the holding company, does not believe the situation in Ohio has advanced as far as it has in Pennsylvania.

In western Pennsylvania interest still centers upon the operations of the Pittsburgh Coal Co. and the Pittsburgh Terminal Coal Corporation. The Val-

ley Camp Coal Co. is endeavoring to persuade former employees living in company houses at Soudan and Kinloch to vacate without resorting to eviction proceedings. Ten families already have moved out at Soudan and 35 houses have been vacated at Kinloch. No attempt will be made to operate these properties until the majority of the houses are available for men willing to work on the company's terms.

Several days ago a watchman at the Soudan property was beaten up and left for dead by a mob. Nearly 50 arrests were made, but all but four men were discharged and the union put up bonds for the men held. On the morning of May 11 two bombs were thrown at the fan house at Kinloch when eight pumpers were at work, but little damage was done. The Valley Camp company has fenced in its property at the Soudan and Kinloch mines.

The Pittsburgh Coal Co. reports that in the week ended May 14 its 18 open shop mines in the Pittsburgh district produced 115,246 tons of coal with an average of 5,226 men at work.

No steps have been taken to reopen the mines of the Vesta Coal Co. The Hazel mine of the Chartiers Creek Coal Co., at Canonsburg, is working on a small scale. Another recruit to the open-shop ranks is the Boggs mine of the Montour & Lake Erie Coal Co. This mine was one of the first to follow the lead of the Pittsburgh Coal Co. when the latter started open-shop in the summer of 1925, but did not, at that time, continue non-union operations. A number of other companies are reported to be ready to open up as soon as they think conditions opportune.

Output Gains at Coverdale

The Pittsburgh Terminal Coal Corporation is confining its efforts at open-shop operation to the Coverdale mine. It is understood that no attempt will be made to start up other properties until Coverdale has been brought up to full production. Officers of the company realize that the process of recruiting an adequate working force must necessarily be a slow one, but they are well pleased with the progress already made. Although no statements as to the tonnage coming out of Coverdale are made public, it is known that there has been a substantial increase in the daily output when compared with the production the first few days of open-shop operation.

The corporation, however, has been less successful in its efforts to evict its former employees from company houses. On May 11 Judge Macfarlane of the Court of Common Pleas of Allegheny County denied the petition of the coal company to set aside the supersedeas in the miners' appeals to the Superior Court from an earlier decision of the lower court refusing to open the judgments and to set aside the evictions. The effect of this decision will be to delay final action for several months as the Superior Court will not sit in the case before next fall.

With this decision as a precedent, announcement was made by counsel for the United Mine Workers that every eviction case started in the Pittsburgh district would be appealed to the higher

court if eviction orders were approved by the lower courts. If this move is successful, the coal companies will be forced to provide other quarters for men brought in to take the place of the strikers.

Despite these minor setbacks there seems to be little doubt that the open-shop movement in western Pennsylvania will spread unless the United Mine Workers changes its program. In fact, there probably would be more companies today attempting to run non-union if there were a market to support production. But the truth of the matter is that non-union shippers find it difficult to sell West Virginia coal in the markets normally supplied by the Pittsburgh producers and must compete for business with the Pittsburgh Coal Co. and with the Consolidation Coal Co. with its non-union plants in the Fairmont region.

Operators' Policy Unorganized

Under these conditions there is little inducement for the majority of the operators in western Pennsylvania to hasten the long and costly fight to free themselves from union domination. The situation is further confused by the lack of an organization among the operators since the disbanding of the Pittsburgh Coal Producers' Association. All contacts and exchanges of views on policy, therefore, must be informal and more or less desultory. Yet this is also a handicap to the union organization as well since it cannot foresee from what quarter the next campaign will be launched.

Notwithstanding the lack of incentive for immediate reopening of more mines, the sentiment in operating circles in the Pittsburgh district is strongly in support of those companies which are fighting against a renewal of the Jacksonville scale by running open-shop. At the bottom, this sentiment seems not so much anti-union as anti-Jacksonville. But as time goes on this distinction probably will be lost.

Agreement upon working conditions in the Southwest was effected at Kansas City, Mo., May 11 when the general conference of operators members of the Southwestern Interstate Coal Operators' Association and representatives of districts 14, 21 and 25 ratified the report of the subscale committee of the conference. This report read as follows:

We, your subscale committee, to whom was referred on March 17 the operators' proposal and the miners' proposal for a contract, beg leave to report that we have had same under consideration and that being unable to agree upon the adoption of either proposal in its entirety, we beg to report that we have agreed upon and adopted the following resolutions and sections for a contract:

(1) That the operators' substitute resolution offered in subcommittee March 17 be adopted. This resolution is in lieu of the operators' and miners' first resolutions and reads as follows:

"We propose an agreement for districts 14, 21, and 25 for a period of two years from April 1, 1927, embodying all of the written terms of the 1924 contract, including all decisions, agreements and rulings of the Interstate Joint Commission, commissioners and district officers, made during the 1924-27 contract period that are in writing, together with such changes or additions as may be mutually agreed upon, with the exception of the scale of wages as to day and monthly men, tonnage, dead-work and yardage rates, which shall be made a matter of negotiation, the scale committees representing the miners and operators to continue in session to that end."

(2) That a resolution of March 31, offered in subcommittee, providing for the consideration of interpretations and fundamental principles underlying certain decisions of the Interstate Joint Commission and with reference to rules of procedure, shall be adopted and immediately taken up for final determination and when final conclusions have been determined the same shall be for the guidance of the Interstate Joint Commission in the future handling of cases and rendering decisions under the contract. This resolution reads as follows:

"Resolved, by the subscale committee of miners and operators, that it is agreed that after the adoption of the operators' substitute resolution of March 17 the joint scale committee shall give consideration to the interpretation of the fundamental principles underlying certain past decisions of the Interstate Joint Commission, also to certain rules for the government and procedure of said commission, to the end that certain fundamental principles and rules of procedure may be determined for the guidance of the Interstate Joint Commission in the handling of future cases and rendering decisions under the contract."

(3) That negotiations on the wage scale be taken up, each side presenting such basis for negotiations for a wage scale as they may elect.

(4) It is understood and agreed that the first and second paragraphs of this recommendation shall not be effective until a wage scale has been agreed upon, at which time the resolutions above referred to will then become in full force and effect.

From one of the worst plague spots in the industry, the Southwest in the past three years has developed into one of the models in co-operative labor relationships. This has been effected largely through the instrumentality of the Interstate Joint Commission, upon which the operators are represented by W. L. A. Johnson, commissioner of the Southwestern Interstate Coal Operators' Association, and the union by John P. White, former president of the United Mine Workers. This commission has ironed out many of the disputes over contract interpretations and has done much to eliminate the "wildcat" strikes which gave the Southwest such an undesirable reputation.

Relations Better in Southwest

Although there have been marked losses in union control in the Southwest since the Jacksonville agreement was signed, those operators who have continued to deal with the United Mine Workers felt that so much had been accomplished in improving labor relationships that a guarantee that the changes and clarification which had made this improvement possible must be the first consideration in the negotiation of a new contract. They were willing, therefore, after the first interchange of opinion on wages and the decision to suspend operations pending a new agreement, to sidetrack the wage question until the other problems had been settled.

At the present time the mines represented in the negotiations have daily capacity of 34,435 tons. The daily capacity of the Southwestern mines paying the 1917 scale is 25,495 tons. This includes 29 mines in Arkansas with a daily capacity of 6,225 tons; 80 in Oklahoma with a capacity of 15,750 tons, 28 in Kansas with a capacity of 2,485 tons and 13 in Missouri with a capacity of 2,035 tons. Of course, not all of these mines are working at the present time.

There are 88 mines represented in the Kansas City conferences. This number includes 20 in Arkansas with a daily capacity of 7,000 tons, 2 in Oklahoma with a capacity of 550 tons, 47 in Kansas with a capacity of 21,370 tons and

Study American Industry at Geneva Conference; Modified Adoption of Methods Likely

By E. J. Mehren

Vice-President and Editorial Director, McGraw-Hill Publishing Co.

(By Cable from Geneva)

Geneva, May 13.—While the International Economic Conference continues to hold sessions, the various committees are engaged in the drafting of resolutions. The discussions follow the same trend as indicated in last week's cable.

In the Committee on Industry American industrial methods have been the center of discussion for two days. Delegates from England, France and Italy have contended that our methods are not applicable to Europe, though no such protest comes from the German delegates. Despite those protests, however, it is evident that American experience has made a deep impression and is sure to be widely applied with necessary modifications.

Opinion is sharply divided on the subject of international pools. The small and backward countries fear

them, though others regard them as economic saviours. The Germans apparently regard them as temporary expedients to aid in economic recovery. All agree that in their operation the consumers and workers must not be exploited. There is also a sharp disagreement on the possibilities of international control.

Henry M. Robinson, chairman of the American delegation, showed the increase of our purchases from Europe and the importance of making purchases from newly established countries. He urged the financing of undeveloped countries, which, by taking equipment and machinery from Europe, would re-stimulate European industry. The Russians are still inviting capital to their country, insisting that the Communistic régime must remain.

19 in Missouri with a capacity of 5,515 tons. All of these mines are down.

From these figures it will be seen that the union has lost practically all of Oklahoma and has weakened considerably in Arkansas and Missouri. The United Brotherhood of Miners, recently organized in Missouri, is said to be making some headway and may step into the picture if there should be a rupture between the Southwestern Interstate Coal Operators' Association and the United Mine Workers over the question of wages. Unless there should be some radical concession in rates it is likely that the Arkansas tonnage now represented in the conference will break away and join other Arkansas operations now paying the 1917 scale.

British Ministry to Amend Anti-Strike Bill

A storm of protest by Conservative members of the British House of Commons over the government's Trade Union bill elicited a promise last week from the Attorney General, Sir Douglas Hogg, to amend the measure in the direction of greater moderation. On the second reading of the bill, several of the government supporters had stated that if it could be shown that the first clause went further than the prevention of a general strike they would vote for its amendment. Thereupon, Captain T. J. C. O'Connor and Captain H. C. Mac-Millan, two of the younger Conservatives, moved to completely remodel the first clause, their object being to exempt from the liability to a criminal charge, though not from a civil charge, purely passive participants in an illegal strike.

The Attorney General promised, in reply, to introduce an amendment so as to punish only the ringleaders in a

strike and to exonerate their "dupes." The incident also led Sir Douglas to define the kind of strike which the government wishes to outlaw. The illegality of a strike would not depend on the mere number of the strikers, he said, but on their clear intention to coerce the government. A strike to be illegal must have a political object and must be calculated to coerce the government. This double requirement would protect all industrial strikes, whether sympathetic or not.

Answering the point raised by David Lloyd George, he said that if the coal miners, for example, struck for shorter hours, that would be legal, even though it involved pressure on the government to amend the Eight-Hours act. If, however, the railwaymen struck in sympathy, with the object of compelling the government so to act, that would be an illegal strike.

An amendment introduced by Sir John Simon was defeated, after the government had terminated the debate by moving the cloture. This motion received loud and angry shouts of "gag" from the Labor benches.

A long series of Labor amendments also were defeated by the use of the cloture.

Railroads Offer Rate Cut

Freight rates on anthracite brought into Connecticut by the New York, Ontario & Western Ry. and the New York, New Haven & Hartford system will be adjusted downward voluntarily if the Interstate Commerce Commission approves a new schedule of rates recently filed with it. The reduction in freight rates is directly in line with the objective sought by Governor Trumbull in his recent efforts to throw the resources of the state behind the rate-reduction movement.

Smokeless Men Hold Record Session in City of Bluefield

No meeting ever held by the Smokeless Coal Operators' Association was so well attended or aroused so much interest as that which culminated in the banquet at the West Virginian Hotel, Bluefield, W. Va., May 13, at which the principal speakers were J. G. Bradley, of Dundon, W. Va., president of the West Virginia Coal Association, and H. L. Gandy, executive secretary of the National Coal Association. The Pocahontas Coal Operators' Association was the host.

Mr. Bradley's subject was "The Contribution of the Coal Industry to the Community." He declared that half the people of West Virginia depended directly on the fortunes of the coal business for their welfare and that years in which they had failed to recognize their community of interest had been followed recently by a period of harmonious co-operation in which all the citizens of the state were beginning to take part. The best interest of the coal industry had become a paramount concern to the legislators and Governor of the state. He attributed much of the rapprochement to the building of good highways throughout the state, which made possible a closer contact between the operators hitherto isolated from one another.

H. L. Gandy discussed some of the aids to progress in the effort of the bituminous coal industry to combat unfavorable conditions. W. C. Atwater, president, W. C. Atwater & Co., of New York, was toastmaster and gave reminiscences of the early Pocahontas field and of F. J. Kimball, of the Norfolk & Western Ry., from whose foresight and energy the Pocahontas region received its connection with the market and its first mining operations.

In the morning the Pocahontas Coal Operators' Association held its annual meeting, at which W. C. Atwater was elected president; James Elwood Jones, of Switchback, W. Va., vice-president; John J. Lincoln, of Elkhorn, treasurer, and W. E. Koepler, secretary. Besides the first three the executive committee consists of Morris Watts, J. A. McQuail, H. C. Faust, L. E. Woods and W. A. Richards, the last being a new member. The Pocahontas operators will join with the Bluefield Chamber of Commerce in an entertainment to six visiting British coal operators. They approved the suggestion that henceforth the Smokeless Association meet in a different market town each year like Cincinnati, Chicago or Cleveland rather than in New York City as in past years.

In the afternoon the board of governors of the Smokeless Coal Operators Association held a meeting which was followed by a general session. The Smokeless Association offered its support and co-operation with the Virginia Polytechnic Institute, at Blacksburg, Va., in the development of research work to determine the various chemical uses of coal, the new chemical laboratory of the latter institution being used for that purpose.

Lewis' Refusal to Debate Question Of Wages Seen as Obstacle to Peace Between Union Miners and Operators

By Paul Wooton

Washington Correspondent of Coal Age

Ordinarily a bulletin from the Federal Council of Churches of Christ in America on the wage controversy in bituminous coal mines would not be looked upon as a paper of consequence. In spite of its imposing title it is known that the Council of Churches is not a closely knit body in a position to mobilize the consensus of opinion of church-going people. Developments in the strike are so few, however, that this document and the rejoinder it drew from John L. Lewis, president of the United Mine Workers, constitute about the only base on which speculation can be built.

Some observers, outside of the government service, see in President Lewis' letter an effort to win support as well as revealing lack of confidence in the outcome of the strike.

There are disinterested observers who are convinced that Mr. Lewis is trying sincerely to find a way to a peaceable and honorable settlement and is personally disposed to go just as far as his constituents will let him in meeting the differences with the operators. It is recognized that a shrewd and well-informed leader such as Mr. Lewis must appreciate as fully as any one else the loss of union fighting strength and bargaining power which has taken place since 1922. Until the actual test of strength came there was some uncertainty as to the attitude of the union operator and as to the producing capacity of the non-union fields. In addition, there was no accurate information as to the amount of coal in storage.

These uncertainties now have been removed and a month and a half of the strike has passed without developments favorable to the mine workers. Seeing the serious straits through which the union is passing, it is regarded as natural that Mr. Lewis should be making efforts to reach an agreement. These observers see in the letter to the Council of Churches a genuine desire to conciliate the operators. By reading between the lines they see a willingness to make concessions. They feel it would be well for the union operators not to dismiss the Lewis letter as being of no consequence, but instead encour-

age him to amplify what he considers the constructive features of his plan.

Reflecting this point of view further, it is contended that there is little chance that an effort would be made to resume mining in Illinois, Indiana and Ohio on a non-union basis. As a consequence, it is argued that all the operators in those states can do is to obtain the best possible terms by negotiation. In his letter to the Council of Churches Mr. Lewis reiterated the resolution which he offered at Miami. Some think that he is ready to broaden the scope of that resolution, in which he proposed a joint continuing agency "to strive for conditions in the industry which will give proper return to capital invested therein and will protect and advance the living standards of those employed in the industry."

Mr. Lewis says this clause covers the widest possible area. Others point out, however, that Mr. Lewis also includes in his resolution a statement that wage reductions do not constitute a remedy and demands a guarantee that there will be no change in wages for two years. This is held to tie the hands of a proposed joint agency so that it could not grapple satisfactorily with the situation.

It must be admitted that there is something to be said for the idea that a reduction in the Jacksonville scale would not overcome the advantage which the non-union mines possess. Certainly the point is not settled and it cannot be ruled out of the things which the joint agency would consider. Such a condition certainly does not encourage those of the union operators who prefer to deal with the union if they can. Just as many of the operators are charged with not appreciating that Mr. Lewis may have a sincere desire to do something constructive, it may be said with equal force that Mr. Lewis fails to appreciate that the rate of pay is a highly debatable question.

If it is true that Mr. Lewis wants to be constructive it seems apparent that his advances will not be taken very seriously if the wage rate is not allowed to come up for discussion on its merits.

Sandusky Sets Dumping Mark

The Pennsylvania R.R. dock at Sandusky, Ohio, loading Norfolk & Western coal, made a new high record for dumping on Lake Erie docks when 1,254 cars were dumped in a forty-six hour period closing Saturday morning, May 7. This exceeds by 125 cars the previous high record recently made by the Hocking Valley docks at Toledo, loading Chesapeake & Ohio coal. One of the two Pennsylvania machines dumped 102 cars in two hours, which is as rapidly as these machines have ever been operated.

Schwab, Sunny Seer, Envies Collegians

Sounding a high note of optimism for the future of American industry, Charles M. Schwab, steel master extraordinary, in an address at Pennsylvania State College last week, told the students that such is his faith in what the next twenty-five years will bring forth that he would gladly swap places with any one of them.

"With only 5 per cent of the world's population, the United States is doing 60 per cent of the world's manufacturing," Mr. Schwab declared. "If that has been done in my time, what will be done in the future and what a chance you young fellows have in the next twenty-five years!"

Ask Permanent Injunction In Maynard Case

A plea that the courts continue in force an injunction granted the Maynard Coal Co. of Ohio against the Federal Trade Commission to prevent the enforcement of penalties for failure to file monthly reports sought by the Commission was made last week. Unless this is done "the greatest coercive weapon ever conceived" will be at the disposal of the Commission to put out of business any person or firm that has the temerity to fight it, was asserted to the District of Columbia Court of Appeals May 12 in a supplemental brief presented by counsel for the Maynard company.

If the injunction is removed the coal company will be under a penalty of \$100 a day for its refusal to supply the information asked for by the commission.

Attorneys for the Maynard company insist that the injunction remain in force, notwithstanding the decision of the U. S. Supreme Court in the Claire Furnace case, which was not decided on its merits, but was sent back for the reason that the equity courts were without jurisdiction to grant relief to twenty-two Eastern steel corporations that refused to furnish reports to the commission.

The Trade Commission in both the steel and the coal cases proceeded under the joint resolution of Dec. 15, 1919, which authorized an investigation into the high cost of living following the war. In the steel cases the Attorney General attempted to begin mandamus proceedings to compel the steel men to file reports, but was enjoined by the equity.

An old coal trestle on the canal at Morrisburg, Ont., near Prescott, has been torn down, owing to the abandonment of the water route for shipments of coal there. The trestle was erected many years ago when much activity prevailed in this trade. Now the coal comes by the Canadian National Rys. and new unloading equipment has been provided by that line.

EDITOR'S NOTE.—The foregoing Washington letter reflects certain views of official Washington. Due to the fact that policy as a rule prevents government officials from permitting their views being quoted directly, the authority for these reports is necessarily somewhat vaguely referred to. The views reflected are not those of any one group of officials, but of different men, in the legislative and executive departments. There is no necessary connection between their views and COAL AGE editorial policy; neither do they necessarily represent Mr. Wooton's personal views. It is felt that the opinions thus faithfully reflected will be of great interest to the industry. Where opinions are cited from sources outside of the government, the source will be specifically stated.

American Mining Congress And Machinery Exposition Opens with Many Exhibits

With 114 exhibits and several hundred persons present the combined national exposition of coal-mine equipment and fourth annual convention of practical coal-mining men of the American Mining Congress started out May 16 at Cincinnati, Ohio, under the most favorable auspices. In the afternoon a session of subcommittee No. 5 of the committee on mine drainage discussed the subject assigned to it, namely, Mine Water and Its Action Upon Mine Drainage Equipment. The committee on mine ventilation was unable to meet because of the absence of the chairman.

The exposition was formally opened with a tour of the exhibition hall by the Mayor of Cincinnati, Murray Seasongood, who was accompanied by J. A. Reilly, vice-president, Queen City Coal Co., and preceded by J. L. Callbreath, executive secretary of the Congress; Dr. H. M. Payne, consulting engineer; Ezra Van Horn, chairman, program committee, and H. K. Porter, chairman manufacturers' division. The meeting that followed was called to order by N. L. Mahan, president, Cincinnati Coal Exchange, who introduced Mayor Seasongood.

Proud of Coal Gateway

The Mayor said that Cincinnati prided itself on being a distribution center for 200,000,000 out of nearly 600,000,000 tons of bituminous coal annually produced in the United States. He declared that the Ohio River had not been used as much as was desirable in the distribution of this tonnage, but with the improvement of its navigation, the completion of its dams and with better facilities for coal handling the river was sure to attract a growing coal tonnage.

Mr. Porter voiced his appreciation of the spirit of co-operation of the city in making Cincinnati a suitable place for the annual exposition and convention. Mr. Van Horn declared that the coal industry was entering on an age of mechanization. Operators must install more machinery and many of them are looking forward to the time when the mines will be completely mechanized, for every operator is striving for supremacy and endeavoring to give the best service to his customers.

Over eighteen hundred registered by mail to Washington, D. C., their intention of being present at the convention, but the number actually in attendance will greatly exceed that figure.

On Tuesday morning Howard N. Eavenson, consulting engineer, Pittsburgh, presided over a session on coal preparation, remarking that the coal industry needed all the economies it could effect for the purpose of increasing safety and paying stockholders the dividends to which they were entitled.

E. A. Holbrook, dean, School of Mines, Pennsylvania State College, said that the work of preparation must be put in the hands of preparation specialists and not of mining engineers or

chemists. It might be an unwelcome stepchild but it had come to stay.

F. G. Wilcox, president, West End Coal Co., Scranton, Pa., in his paper on "Impurity Elimination in Anthracite," said that consumers of anthracite for domestic and industrial purposes were demanding a better prepared product year by year. D. C. Ashmead, consulting engineer, Wilkes-Barre, Pa., discussing the paper, declared that lessors were demanding more coal per foot-acre. By bringing out all the coal and cleaning it on the surface more coal could be produced per man-hour. He believed that too much stress could be placed on face cleaning.

Urges Bonuses and Penalties

Erskine Ramsay, chairman of the board, Alabama Byproducts Corporation, Birmingham, Ala., said that by taking a sample of 100 lb. out of each mine car and establishing bonuses and penalties the coal could be cleaned entirely in the mine and at a cost of 2c. per ton for sampling. Nine men at three samplers could ascertain the quality of 1,500 tons daily. The quantity of the sample taken on a 3,000-lb. mine car was equivalent to a 2-ton sample taken from a 60-ton railroad car, so the sampling was better than was customary at point of receipt.

Humphrey Smith, assistant to the president, Majestic Collieries Co., Bluefield, W. Va., delivered a paper on "Elimination of Impurities in Bituminous Coal."

Warren R. Roberts, Roberts & Schaefer Co., Chicago, said that coal could be cleaned by wet methods up to 5 in. and by dry methods up to 3½ in. E. M. Chance said Chance washers would wash up to 8 or 10 in. J. R. Campbell, of the American Rheolaveur Corporation, said if 20 per cent of waste were removed and the waste ran 10 per cent of coal only 2 per cent of coal was wasted and not 20 per cent.

J. William Wetter, general manager, Madeira, Hill & Co., Philipsburg, Pa., and J. B. Morrow, Phelps Dodge Corporation, Dawson, N. M., described in papers a sand flotation plant at Mount Union, Pa., and a wet table plant at Dawson, respectively.

Eight Trapped by Explosion In West Virginia Mine

Eight miners—four white and four colored—are believed to be dead as the result of an explosion late in the night of May 13 in the Shannon Branch mine of the Central Pocahontas Coal Co., one mile west of Welch, W. Va. The men were entombed by the blast, which occurred soon after midnight in sections 9 and 10, East, about one and three-quarter miles from the entrance to the mine.

All hope of rescuing the men was abandoned late the following afternoon, when a second blast drove a rescue party of company officials and state mine inspectors from the workings. They escaped uninjured.

West-bound shipments through the Sault Ste. Marie Canals during April included 1,699,797 net tons of bituminous coal and 57,422 tons of anthracite.

Value of Better Methods And Co-operation Shown In Cutting Rail Fuel Cost

An extensive exhibit of railway appliances used in connection with the consumption and conservation of fuel was shown at the nineteenth annual convention of the International Railway Fuel Association in Chicago, May 10 to 13. The exhibit was made by the International Railway Supplymen's Association.

J. E. Davenport of the New York Central Lines was elected president to succeed E. E. Chapman of the Santa Fe Railroad, retired. The following were elected vice-presidents: C. H. Dyson of the Baltimore & Ohio; T. C. Hudson of the Canadian National Rys., and W. J. Tapp, of the Denver & Rio Grande Western. L. G. Plant of the Railway Exchange, Chicago, was elected secretary-treasurer.

Addresses were delivered by Mr. Chapman; Dr. George Otis Smith, director of the U. S. Geological Survey; Carl R. Gray, president of the Union Pacific System; Dr. H. Foster Bain, secretary of the American Institute of Mining and Metallurgical Engineers; L. K. Silcox, general superintendent of motive power of the Chicago, Milwaukee & St. Paul Ry. and chairman of the mechanical division of the American Railway Association; T. H. Williams, assistant general manager of the Southern Pacific Co.; E. E. Regan, general superintendent of the New York, New Haven & Hartford R.R.; H. S. Rauch, division superintendent of motive power of the New York Central R.R.; C. F. Richardson, president of the West Kentucky Coal Co.; F. S. Wilcox of the Edna Brass Co. and president of the International Railway Supplymen's Association; C. B. Page, mechanical engineer of Chicago; N. D. Ballantyne, assistant to the president of the Seaboard Air Line; C. A. Moore, Canadian National Rys.

Mr. Gray said that a continuing car shortage is now unknown owing to better relationships between the railroads and the public and co-operation generally of management and employees.

"Figures prepared by the Bureau of Railway Fuel Economics show that while in 1920 197 lb. of fuel was used per 1,000 gross ton-miles in freight service on all class 1 roads, a continuous reduction has taken place annually until the splendid showing of 155 lb. was made in 1926, a reduction of 21 per cent," said Mr. Gray.

Dr. Smith said the conquest of distance was the big task before the railroad men. Reduce the number of miles or cheapen the miles and eliminate cross-hauls, he urged. He added that the public needs an economical distribution of products perhaps even more than it needs lower freight rates.

Dr. Bain pointed out that there is a natural and necessary community of interest between the railways and the coal industry, for 30 per cent of the bituminous coal mined in the United States and 5 per cent of the anthracite is used by the railroads. While in 1925 of the freight carried by the class 1 roads 35.8 per cent consisted of coal and coke.



News Items From Field and Trade



ALABAMA

Mines in \$1,000,000 Suit.—More than \$1,000,000 worth of coal lands are said to be involved in a suit in the Walker County Circuit Court in which the Peters Mineral Land Co. of Gadsden, is the plaintiff. The company is said to be trying to recover the inheritance of Thomas Peters Henley, grandson of Thomas Peters, one of the pioneers of the Birmingham district. About 6,000 acres of land and several coal mines are involved, it is said.

To Open New Mine.—The Southeastern Fuel Co. is opening a new mine at Charlotte, near High Level, Walker County, in the vicinity of the Winona mine of the corporation, which is a subsidiary of the Alabama Power Company. A. B. Aldridge, of Birmingham, is president.

Warrior View Property Sold.—The Warrior View Coal Co., Birmingham, with coal holdings in Tuscaloosa County and an active operation at Warrior View, on the Warrior River, has sold its properties to the Seaboard Coal Mining Corporation. It is stated that about 1,100 acres is involved in the deal and that options also have been taken on other lands in the vicinity. A mortgage in favor of the American Trust Co. of New York, protecting a \$1,000,000 loan in financing the deal has been filed in the probate office at Tuscaloosa. Negotiations for the Seaboard Corporation were conducted by Francis B. Wood, and T. B. Ward, of Tuscaloosa, handled the legal matters. The Warrior View Coal properties have been owned and operated for some time, J. W. Lewis, of Birmingham, being president. The Warrior View mine is a drift opening on the Brookwood seam of coal.

INDIANA

Inspectors Renamed.—There will be no change in the personnel of the mine inspection board of Indiana, it was indicated with the reappointment of five inspectors by Governor Ed Jackson. Those who have been appointed for terms of four years are Thomas Gillespie, of Bicknell; John Bishop, of Princeton; James Russell, of Sullivan; S. J. Wilton, of Terre Haute, and John Stevely, of Clinton. These men have been on the board for a number of years.

Dixie Bee Shaft Resumes.—The Dixie Bee mine, at Pimento, owned by the Eureka Coal Co., has resumed operations after being idle since April 1, when the mine closed with other shaft

mines of the state. It is said at the mine that the company has sufficient orders to provide steady work for the 300 men the mine employs.

Mechanics' liens against the General Fuel Corporation operating the Somerville coal mine, at Somerville, which has gone into the hands of a receiver, are being filed by numerous employees who have failed to receive their pay checks for the last two weeks that the mines were operated. The payroll, which will be covered by these liens, aggregates approximately \$50,000.

The Stock coal mine, at Chandler, is laying another switch from the mine to the traction line, in order to take care of increasing business. The Stock mine has been in operation for about two years and Charles S. Cook, of Evansville, formerly owner of a brewery, is one of the principal owners.

Coal Companies Add to Holdings.—The Sunnyside Coal & Coke Co. and the Crescent Coal Co., both of which have mines located near the corporate limits of Evansville, have obtained coal rights to tracts located near the two mines, it was revealed with the filing of deeds in the County Recorder's office at Evansville. The price paid for the tracts was not made public.

MISSOURI

Boylston Suit Dismissed.—A suit filed in the U. S. District Court in St. Louis, Mo., on Feb. 26, 1926, by the Boylston Coal Co. of Chicago in which it sought \$75,000 damages from twenty-eight individuals and coal companies, members and officials of the Missouri Retail Coal Dealers' Association, has been dismissed by Judge Davis on motion of the defendants. The Boylston company had alleged violation of the Sherman anti-trust law, claiming that the defendants had unlawfully conspired to persuade coal producers not to sell the Boylston company on the alleged grounds that the Chicago concern was an irregular dealer. The motion of the defendants for dismissal was sustained by the judge when it was shown that the Boylston company went into receivership on Feb. 10, 1926, before the suit was filed and that the suit had been filed without the consent of the receiver, Frank M. McKey.

NEW YORK

L. E. Chandler has been appointed trustee in bankruptcy for the Agnew-Smith Fuel Co., of Buffalo. A number

of Cleveland companies are listed as creditors. William J. Smith, who was the junior member of the firm, has opened an office in the Walbridge Building as sales agent of the Campbell Coal Co.

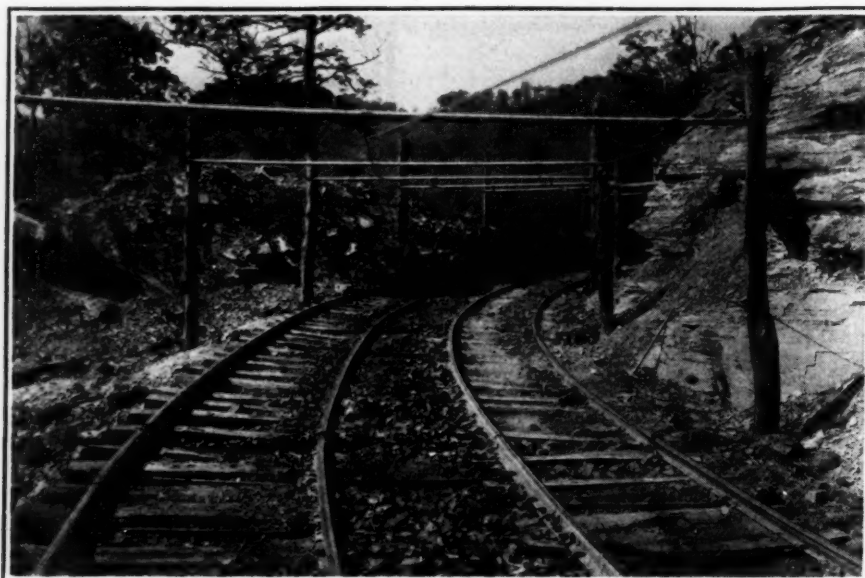
OHIO

The establishment of a research laboratory for the study of fossil coal-producing plants was celebrated last week by the students and staff of the University of Cincinnati botanical department at a dinner and demonstration given in the laboratories at which Mrs. Samuel Taft, whose benefaction provided the equipment, was the guest. The use of the equipment then was demonstrated by Dr. J. Hobart Hoskins, who will use it in his researches. Within the last few years it has been discovered that fossil plants are a much better guide in locating coal beds than the animal fossils previously used.

PENNSYLVANIA

Enjoins Drainage Into Competitor's Mine.—An important decision made recently by the State Supreme Court affirmed the judgment of Luzerne County courts in granting an injunction restraining the Pittston Coal Mining Co. from discharging water into the adjoining mine of the Lehigh & Wilkes-Barre Coal Co. in Hanover township. In 1918 the defendant company drove an 850 ft. tunnel through rock on its own land to another body of coal and reached a space of broken rock about 20 ft. from the plaintiff's line. The tunnel was driven on a slightly ascending grade with a ditch alongside of it on a descending grade so as to cause surplus water to be discharged among the broken rocks. This saved the defendant the expenses of pumping the water to the surface, which hitherto had been done. The water so discharged, however, flowed into the plaintiff's mine. Because of unforeseen delays including the death of the chancellor and one of the defendant's attorneys, a final decree granting the injunction asked for was not entered until six years after the suit was filed. The defendant then took an appeal.

To Reclaim "Lost" Coal.—Awarding of a contract at the Audenried mine of the Lehigh & Wilkes-Barre Coal Co. for a tunnel to connect the Gamma and Wharton seams is another step to reach coal measures that years ago were deemed lost. In some places in the hard-coal field where squeezes have broken down the top rock, cribbing is



Double-Track Outside Haul at Bonny Blue, Va.

This 6,000-ft. outside haul of the Bonny Blue Coal Co. is laid with 60-lb. steel. On sharp curves the tracks are held to gage and centers with Coover rail braces. The gage is 48 in. A 6-ton locomotive (with 8-ton electrical equipment) is shown hauling forty 3-ton cars.

run through the shattered mass so that a passage has been finally built through which men go to get to portions of the mines where coal exists but which it once had been feared were lost forever. The plan is being followed also at No. 3 mine with good success. Workings cut off by caves fifty years ago are now being reached and worked.

The Lehigh Coal & Navigation Co. recently donated all its vacant land in the town of Mauch Chunk to the borough with the understanding it be used for park purposes. The Councilmen have voted to accept the offer.

Since the last assessment made in Luzerne County it is figured there has been mined and shipped coal valued to the extent of more than \$2,000,000. As a result this amount has been cut from the valuation levied against holdings of coal companies in the county.

New Town Site Begun.—A new town site is being established at the Shannopin coal properties of the Jones & Laughlin Steel Corporation on the Monongahela River. The plans call for a new steel tippie and other modern equipment, to be completed in August.

Shipments of bituminous coal (revenue) by the Reading Co. during March, 1927, totaled 2,280,183 gross tons, compared with 2,024,580 tons in the corresponding month of the preceding year.

In line with their policy of stimulating the sale of hard coal, operators in the Pottsville field have engaged fifteen expert combustion engineers to make a complete survey of the anthracite region. They will start their tour at Mt. Carmel. The engineers are to study the relative value of anthracite as fuel in comparison with other fuels, including bituminous coal and oil. This group will make a complete report of their findings and it will furnish the basis for a series of advertisements to be used by anthracite operators to increase sales throughout the country.

Boost Hard Coal.—The Scranton Chamber of Commerce has joined in the

movement now general in the anthracite field to promote the sale of hard coal. The chamber is having 100,000 stickers printed and will distribute them among business houses and industrial plants to have attached to their correspondence. The Scranton chamber is bent on making people throughout the East and Middle West believe anthracite is "the best fuel in the world."

Anthracite, its preparation, sale and service, illustrated with many pictures, contributed to the entertainment that followed the luncheon of the Kiwanis Club in the Bellevue-Stratford Hotel, Philadelphia, on May 11. William Auman, of the Anthracite Service, was the speaker. He told of missionary work done among the consumers of coal so that they shall be well instructed in the economical use of such fuel—a free service.

The American Legion at Pottsville is promoting an essay writing contest for children in the schools there, the subject being "Benefits Enjoyed by Communities Burning Anthracite Coal."

Union Officers Denied Back Pay.—An echo of the 1922 strike was heard in the convention of the United Mine Workers of District No. 2, in DuBois last week, when the question arose regarding the payment of approximately \$15,000 in salaries to officers during that strike. The union withheld payment and the case was carried to the Clearfield County courts. A proposal to pay the salaries was defeated in the convention. It was then decided to take an appeal from the court's decision and have the issue decided by the appellate courts. Another proposal was defeated, that of moving compensation headquarters from Johnstown to Clearfield, the United Mine Workers' headquarters.

SOUTH DAKOTA

The state division of purchasing will receive bids on May 24 for 45,960 tons of coal for state institutions. Of this,

14,200 tons will be ordered for shipment before Sept. 15. The awards will be made on the basis of quality and operating results obtained from the same and similar coals on prior tests.

VIRGINIA

Should weather conditions improve to permit the placing of the new machinery and the erection of the new breakers, coal mining operations will start at the Great Valley Coal Co.'s mines at McCoy within the next month. It is understood that six more dwelling houses for employees at the mines will be erected as soon as weather conditions permit.

The Clinchfield Coal Corporation declared the regular quarterly dividend of \$1.75 on the preferred stock of the corporation, payable May 2 to stock of record April 25.

It is reported that work will be resumed at the Big Vein mines, located at McCoy, in the near future. These mines shut down several weeks ago, throwing a large number of miners out of work.

WEST VIRGINIA

Bridge Wreckers Caught.—Three men were caught by Sheriff Lowe in the act of attempting to blow up a bridge in Brooke County on May 4 after Mrs. Joe Muley had informed the manager of the non-union Standard Coal Co., at McKinleyville, that her husband was in a plot to cause some trouble as the result of a strike at the mine. It was stated by the Sheriff that only a week before night guards had detected men lurking near the tippie of the No. 3 mine of the West Virginia & Pittsburgh Coal Co. and fired at them as they fled. The sheriff and state troopers, discovered 83 sticks of dynamite and fuse planted near the tippie.

New Field to Produce Soon.—The first coal from a new smokeless field, where development recently began, will be shipped soon by the Walker New River Coal Co. from its new plant on the Durbin Branch of the Western Maryland in Randolph County. The company recently completed work on its tippie and other plant buildings. The company will operate near Flint, a recently established post office. The existence of Sewell coal in large quantities was discovered in the Cheat Mountain section about two years ago and since then there has been a good deal of prospecting. The Thompson Coal Co. which will operate in the same vicinity, is now engaged in grading about a mile of railroad to its new plant and will be in a position to operate in the near future. Several other coal men are negotiating for the purchase of coal properties in the same section.

Pond Creek Pocahontas Co. reports for the year ended Dec. 31, 1926, net profit of \$79,695, after charges and reserve for depreciation and depletion, equal to 64c. a share earned on 125,000 shares of no par stock. This compares with \$43,956, or 35c. a share in 1925.

American Coal Co. of Allegany County has declared the regular quarterly dividend of \$1, payable May 1 to stock of record April 1.

George P. Hoover gained control of Pittsburgh No. 8 Coal Corporation of West Virginia in a recent deal at Uniontown, Pa. Real estate and \$127,000 cash were tendered for the mine, which with 1,200 acres of coal, is situated 50 miles south of Parkersburg on the Ohio River, opposite Middleport, Ohio.

Companies Reduce Capital.—Decreases in the capital stock of several companies belonging to what is known as the Massachusetts Gas & Power group have been made. The capital stock of the Pemberton Fuel Co. has been reduced from 2,000 shares of \$100 par value each to 50 shares of \$100 each; the Prince-Wick Coal Co., from 3,000 shares of \$100 par value each to 50 shares of \$100 each; the Glencoe Coal Co., from 2,000 shares of \$100 par value each to 50 shares of \$100 each; the E. E. White Coal Co. of Mount Hope, from 25,000 shares of \$100 par value each to 50 shares of \$100 each; the East Gulf Coal Co., from 12,500 shares of \$100 par value each to 50 shares of \$100 each; the Long Branch Coal Co., from 5,000 shares of \$100 par value each to 50 shares of \$100 each.

Incendiaries Burn Tipple.—Fire believed to have been of incendiary origin at 8 a.m. one day last week destroyed the tipple of the Gates mine of the Crystal Block Mining Co., at Sprigg, near Welch. Mingo County authorities are working on the case in the hope of uncovering clues. The Gates mine is one of the more important operations of the Crystal Block Mining Co. and the tipple was thoroughly modern. The structure was fully insured, it is said.

Hereafter the Madeira-Hill-Clark Coal Co. will be known as the Waldo Gas Coal Co.

The Morganette Coal Co. has been dissolved by a U. S. Court decree in bankruptcy.

The Monongahela Valley Coal Association has changed its name to the Fairmont Coal Operators' Association.

The Eclipse Pocahontas Coal Co. has been dissolved as a corporation.

The Climax Coal Co. has increased its capital stock from \$50,000 to \$100,000.

Profits Decline.—The American Coal Co. of Allegany County reports for 1926 a net profit of \$328,846 after all charges, taxes, depreciation and depletion, equivalent to \$6.71 a share earned on 49,598 shares of \$25 par capital stock. This compares with \$435,256, or \$8.73 a share, earned in 1925. The surplus after dividends was \$130,494, against \$234,904 in 1925.

Island Creek Output Mounts.—The Island Creek Coal Co.'s output for the first four months of this year was 30 per cent larger than a year ago. Its April production was 578,000 tons against 432,000 tons for April, 1926; and for the four months 2,353,397 tons, against 1,815,429 for the same period last year.

Extensive improvements are being made at the plant of the C. H. Mead Coal Co. at East Gulf, in the Winding Gulf field. A 15-room clubhouse is an

important feature of the construction work. C. H. Mead, secretary of the Winding Gulf Operators' Association, is president of the company.

Squeeze Damages Fairmont Homes.—Considerable damage was reported in the Watson Avenue section of Fairmont early last week as a result of a landslide caused by a squeeze in the McCoy Coal Co.'s mining operations under that section of the city. Ten residences suffered heavy damage as a result, with other premises showing breaks in the ground. Two large water mains were broken and streets, sidewalks and walls showed big cracks in places. District Mine Inspectors W. B. Riggleman and Thomas Jarret, after making an inspection of the McCoy operation, found that decayed timbering had caused the trouble. Inspector Riggleman stated that there was no danger of any more slipping for the present, but it will be necessary to put concrete reinforcements in at once.

WASHINGTON

At the recent annual meeting of the Morton Coal & Coke Co., Morton, J. M. Bell was elected president; J. W. Strubel of Elam, vice-president; C. B. Sherwood of Satsop, secretary-treasurer. Mr. Bell announced that active operations would be started immediately and output increased as rapidly as demand warranted.

WYOMING

Old Timers to Celebrate.—Old Timer's Day will be celebrated by the Union Pacific Coal Co. on June 11 at Rock Springs. John L. Lewis, president of the United Mine Workers has been invited to give the principal address at the banquet. The bands of Winton, Hanna, Cumberland, Superior, Reliance and Rock Springs will unite in giving a band concert which promises to be an unusual musical spectacle. There will

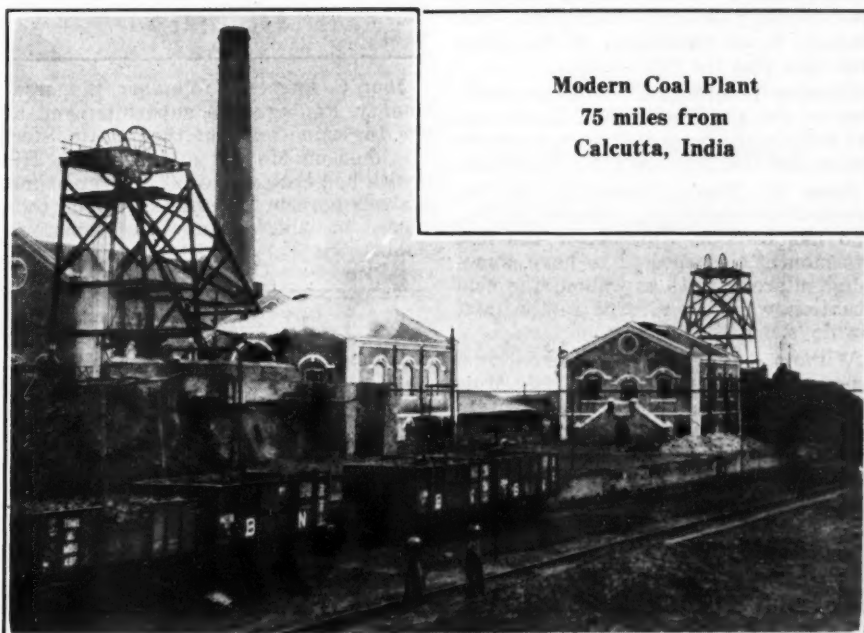
be approximately 175 pieces in the band. The Rialto Theater has been engaged for the day and the plan is to import some high class vaudeville acts for a performance which will be augmented by local talent numbers. Dr. Doyle Joslin, of Dines, will lead in the community singing.

CANADA

Much destitution prevails among the miners of the Drumheller district of Alberta owing to unemployment. The executive committee of the Miners' Unemployment Association in connection with local union No. 59, U.M.W., has sent a lengthy communication to Peter Heenan, Federal Minister of Labor, urging relief measures. They point out that 85 per cent of the miners of this field are employed only for about seven months of the year, the average season being about 120 days, making the average earnings totally inadequate for the support of a family. The Minister is urged to impress upon his colleagues the necessity of securing wider markets for Alberta coal as a means of lengthening the working season, which could be accomplished by establishing favorable freight rates to permit the shipment of coal from Alberta to Ontario in competition with the American product.

Alberta coal operators, in session at Calgary, recently decided to open headquarters in Toronto so that closer cooperation with the Ontario government with regard to marketing Alberta coal in the Eastern province might be obtained. The operators, who represented an annual production of one and a quarter million tons a year, also decided to send representatives to Ontario to address public meetings and otherwise further the interests of their campaign.

Messages received from the coal field at St. Georges, Newfoundland, where boring operations have been in progress, state that a new seam 6 ft. thick not previously suspected had been found below the Cleary seam.



Modern Coal Plant
75 miles from
Calcutta, India

Among the Coal Men

J. D. A. Morrow, president of the Pittsburgh Coal Co. of Ohio, Inc., Rockefeller Building, Cleveland, announces that **V. H. Palmer**, as general manager, will continue in general charge of sales, lake forwarding, car dumpers, fuel docks and lighters. **Elmer C. Striebel**, as sales manager, will have charge of sales in the Cleveland territory. **T. F. Folkner**, as marine manager, will have charge of marine sales at Detroit and Sault Ste. Marie and intermediate territory. **Frank E. Whitaker** will continue as sales agent in the Akron district.

Elmer Wierhake, long prominent in the Cincinnati trade with the West Virginia Fuel Co., the Kentonia Coal Co., General Coal Co. and for the past year in an executive capacity with Castner, Curran & Bullitt, was complimented with a dinner and presentation by the younger set of the Queen City on the evening of May 14, prior to his leaving for Charleston, W. Va., to take over the position of general sales manager of the Smokeless Fuel Co. **Robert McCormick** and **Bob Dickson** arranged the affair.

M. D. Todd of the colliery department of the Staunton Iron Works Co. of Nottingham, England, recently made a tour of the modern coal operations in the Tug River and Pocahontas coal fields of West Virginia. He is especially interested in mining methods in use in southern West Virginia and desired to see the mechanical mining and loading equipment used in the progressive operations.

S. V. R. Spaulding, head of Spaulding, Hedstrom & Spaulding, one of the leading coal firms of Buffalo, N. Y., won first place in the annual trapshooting tournament of the Buffalo Country Club, which began last November and ended in May. He won the H. D. Kirkover trophy as club champion. His brother, **E. G. Spaulding**, of the same firm, was tied for third place.

Thomas L. Morgan, formerly president of the Cincinnati Coal Exchange, has completely recovered from a severe illness that laid him low for a long time.

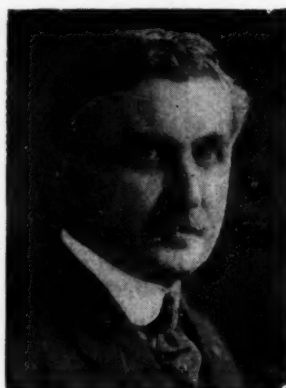
John H. Jones, president of the Bertha-Consumers Co., Pittsburgh, Pa., who has been in Europe for the last two months, is expected to have something interesting to say about the coal situation when he returns in the next few days.

William Dalrymple, international board member of the United Mine Workers from Oklahoma, has been enlisted in organization work in northern West Virginia.

D. N. Snetzinger of the Pittsburgh & Ohio Mining Co., Cleveland, Ohio, and other coal interests has been elected vice-president of the Cleveland Purchasing Agents' Association.

D. W. J. Brown, a member of the engineering staff of the Dominion Coal Co. at Sydney, N. S., has resigned and

gone to Chicago. A few days before his departure Mr. Brown was the guest of honor at a banquet arranged by twenty members of the Cape Breton branch of the Engineering Institute of Canada, when a wrist watch was presented to him. The ceremonies were in recognition of three years of service as secretary of the association by the guest of the evening. Mr. Brown is a son of the late T. J. Brown, former Deputy Minister of Mines.



George Otis Smith

George Otis Smith completed twenty years of service as director of the U. S. Geological Survey on April 30. The combined terms of his three predecessors—Clarence King, Major Powell and Dr. Charles D. Walcott—covered a period of twenty-eight years, from 1879 to 1907.

Obituary

John C. Farber of Windber, Somerset County, Pa., aged 53, superintendent of the Ingleside mine of the Lorain Steel Co., died on May 11 at his home. His health had been impaired for some time. He was born in Houtzdale. Burial took place in the Grandview Cemetery, Johnstown.

Industrial Notes

F. K. Clark of St. Louis, Mo., and **J. L. Ferrell** of Huntington, W. Va., have been elected vice-presidents of the **Hulburt Oil & Grease Co.**, Philadelphia, Pa. Mr. Clark will have charge of the Western district with headquarters at St. Louis and Mr. Ferrell will head the Southern district with headquarters at Huntington.

F. Jacobson of the F. Jacobson Engineering Co., 30 Church St., has been appointed New York representative of

the **Sanford-Day Iron Works**, Knoxville, Tenn. He is an expert in car design as he has devoted most of his business life to that work.

C. F. Messinger was made vice-president of the **Stearns Conveyor Co.**, manufacturers of Stearns conveyors and Rex land-saver storage systems, when that company was recently purchased by **Chain Belt Co.**, Milwaukee, Wis. **Earl D. Stearns** is president of the company; **C. L. Pfeifer**, secretary, and **G. M. Dyke**, treasurer. Mr. Messinger also is vice-president of the Chain Belt Co. of Milwaukee and director of the **Interstate Drop Forge Co.**, Milwaukee, Wis.; **Federal Malleable Co.**, Milwaukee, and the **Nugent Steel Castings Co.**, Chicago, Ill. These companies are affiliated with Chain Belt Co.

Election of **W. J. Webster** as chairman of the board and of **Leland Lyon** as president of the **Atlas Powder Co.** was announced last week. Mr. Lyon was formerly secretary and treasurer. Additional directors elected were **John W. Mathews**, **Isaac Fogg** and **E. W. Maynard**, all officials of the company; **Charles Warner**, president of the **Charles Warner Co.**, and **William de Kraft**, vice-president and treasurer of the **Baldwin Locomotive Works**.

Acquisition of the **Pittsburgh Transformer Co.** was announced by the **Allis-Chalmers Manufacturing Co.** last week. This will give Allis-Chalmers a complete line of transformers covering all voltages, sizes and types. The **Pittsburgh Transformer Co.** is the largest company in the country making transformers exclusively, specializing in smaller and medium size and three-phase transformers. Allis-Chalmers, among its various lines of manufacture, has been building transformers for many years, particularly in high voltage, large size units. Manufacture of the Pittsburgh lines will continue at the works located in Pittsburgh. The facilities of this plant will supplement the other plants of the company at Milwaukee and Cincinnati. **R. V. Bingay**, president of the **Pittsburgh Transformer Co.**, is to become a director of Allis-Chalmers.

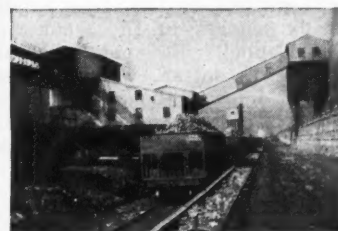
The **Electric Controller & Mfg. Co.**, Cleveland, Ohio, announces the appointment of the firm of **J. B. McCarthy** and **W. P. Robinson** as representatives in Canada. Their offices are at 307 Reford Bldg., Toronto, and 808 Drummond Bldg., Montreal. The company also announces the appointment of the **Petroleum Electric Co.**, 217 East Archer Street, Tulsa, Okla., as representative in Oklahoma and the Pan Handle district of Texas.

Jack Redfern has joined the **Climax Engineering Co.**, Clinton, Iowa, as sales representative. At one time Mr. Redfern was sales manager of the **Power Manufacturing Co.** He is now on the Pacific Coast in the interests of the Climax organization.

Edward C. Dingman, Montreal agent of the **Climax Engineering Co.**, Clinton, Iowa, has moved his office from the Keefer Building to 1120 Castle Building, 1410 Stanley Street. Mr. Dingman handles the sale of Climax engines in Quebec and the eastern provinces of Canada.



Production And the Market



Seasonal Influences Prevail in Soft-Coal Market As Suspension Enters Seventh Week

With the suspension of mining in the Central Competitive Field and the Southwest almost seven weeks old, consumers of bituminous coal, far from showing signs of concern, seem more oblivious than ever of the possibility of untoward developments. Regardless of labor conditions, the market shows every outward evidence of following precedent in its reaction to seasonal influences.

The immense volume of coal stored by consumers, as revealed by the recent report of the Bureau of Mines, remains the dominant element in the market and is likely to retain a position of pre-eminence for some time to come. Its importance just now is reflected with peculiar significance in the Middle West—particularly Illinois—where western Kentucky coal, according to some surface indications, was "all set" for a "killing." Such a notion probably has been dispelled by this time—at least for the present—as Kentucky coals are having extremely rough sledding as far as displacing Illinois and Indiana fuels in the markets usually supplied by the latter is concerned.

New Angle in Market

In some quarters the possibility of a new element in the situation is seen in the government figures on average weekly consumption and exports, which totaled 11,817,000 net tons during the first quarter of the year. As this is

nearly 2,000,000 tons in excess of previous estimates there is some speculation as to whether revised calculations of the lasting power of existing stockpiles will mean an earlier revival of market activity than recent developments would seem to indicate.

Heavy Lake Movement

Aside from the flow of tonnage to the lakes, which continues to exceed 1,000,000 tons a week, there was practically no outstanding feature last week to lighten the dull routine recently characteristic of the trade in most market centers throughout the country. Progressive stagnation prevails in the Middle West, with further weakness in screenings from western Kentucky as well as from Indiana mines that signed up with the union. Smokeless prepared sizes are still in good demand while mine-run is tapering off. Shipments are moving from the Head of the Lakes in heavier volume than a year ago.

Production in western Kentucky has slumped considerably from recent high levels and, with waning demand, a quieter tone prevails there as well as in eastern Kentucky. A heavy movement of tonnage to Cincinnati has done little to check the buoyance in smokeless and high-volatile coals are firmer in sympathy. The Atlantic seaboard markets are marking time. *Coal Age* index of spot bituminous prices on May 16 was 174 and the corresponding weighted

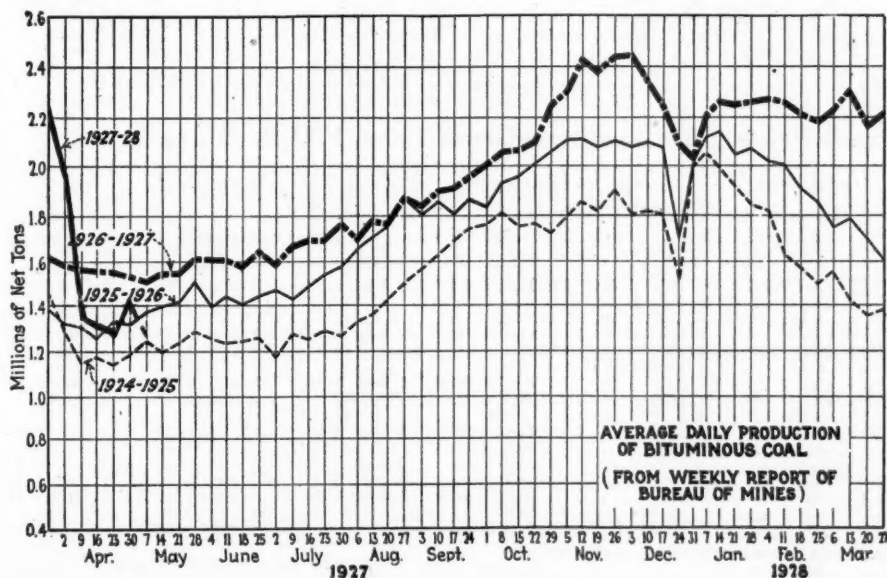
average price was slightly over \$2.11.

Settlement of the issue between union miners and operators which has caused a suspension of mining operations for over six weeks in Illinois, Indiana, Ohio, western Pennsylvania, the Southwest and Iowa seems as far off as ever. Efforts to reach an agreement in the Southwest thus far have been futile as far as the question of wages is concerned, though new working conditions were drawn up and tentatively agreed upon by operators and union officials at Kansas City last week.

Bituminous production during the week ended May 7, according to the U. S. Bureau of Mines, was 8,182,000 net tons, a decline of 242,000 tons from the figure for the preceding week, which was the highest since the suspension began. Loadings for the first two days last week however, were only 51 cars short of the high mark for the same days of the week ended April 30. Dumpings at lower lake ports during the week ended May 15 consisted of 1,065,507 tons of cargo and 45,431 tons of vessel fuel, a total of 1,110,938 tons.

Hard-Coal Trade Holds Up

Anthracite producers are moving most of their output without much difficulty and nearly all mines are operating on satisfactory schedules. Egg leads the demand at New York and is seasonally active at Philadelphia; stove is strong while chestnut drags in both



Estimates of Production

(Net Tons)

BITUMINOUS

	1926	1927
April 23.....	9,271,000	7,937,000
April 30 (a).....	9,125,000	8,424,000
May 7 (b).....	9,039,000	8,182,000
Daily average.....	1,507,000	1,364,000
Cal. yr. to date (c)...	194,660,000	212,807,000
Daily av. to date.....	1,805,000	1,972,000

ANTHRACITE

April 23.....	2,087,000	1,662,000
April 30 (a).....	2,098,000	1,921,000
May 7 (b).....	1,985,000	1,872,000
Cal. yr. to date (c)...	21,552,000	27,510,000

BEEHIVE COKE

April 23.....	228,000	169,000
April 30 (a).....	210,000	176,000
May 7 (b).....	212,000	154,000
Cal. yr. to date (c)...	5,120,000	3,365,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.

markets. The steam sizes are easier in New York but, on the other hand, find a ready market in the Quaker City.

The Connellsville spot coke market continues to soften, with offerings in excess of demand, though output is still receding. Spot quotations are unchanged at \$3 for furnace and \$4@4.75 for foundry.

Midwest Trade Very Quiet

Increasing consumer indifference prevailed in the Midwest market last week. Offerings of western Kentucky coals are too heavy to be assimilated in this section and screenings and mine-run are freely offered at \$1.40, with a downward tendency. Screenings from Indiana mines that signed with the union also are meeting with strong sales resistance. "No bills" are accumulating again at these mines, which had cleaned up the carryover at the beginning of the strike.

Domestic sizes are sluggish, though the demand for prepared smokeless

keeps up. The call for smokeless mine-run has tapered off; though the circular is supposed to be around \$2@2.25 good grades can be had at \$1.80 and bargain lots have been offered as low as \$1.65. Domestic sizes of eastern Kentucky and West Virginia high-volatile coals show a spread from \$1.75 to \$2.50, with standard grade block bringing \$2.25@2.50. Anthracite is moving rather slowly with increased difficulty in disposing of the smaller sizes.

The smaller sizes and steam coals continue to move out of the southern Illinois mining fields, but lump and egg are dragging. Railroad coal, too, clutters the tracks. Similar conditions exist in the Duquoin and Jackson County field. There has been a meager movement of storage coal from the Mt. Olive district, with a heavy surplus remaining. An abundance of the larger sizes still dots the Standard field, though most of the steam grades held for shipping orders have been moved. Prices are unchanged, but the outlook

for the speculative element that loaded heavily in anticipation of high prices is not promising in the face of prevailing quotations on western Kentucky and other non-union coals.

At St. Louis cool, damp weather is prolonging current demand for small orders of the cheaper grades. A small quantity of storage buying is on, but a large share of the booking is for delivery after mining shall have resumed in Illinois. Enforcement of the anti-smoke ordinance is forcing many consumers to use coke, which is fairly active. Anthracite, smokeless and other high grade coals are slow. The local wagonload steam trade is fairly active; carload, country domestic and country steam business, however, suffers from light demand. There are no price changes.

Quieter Tone in Kentucky

Demand in the Louisville market weakened last week, with some shading of prices to move loads on track. At

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern						Midwest					
	Market Quoted	May 17, 1926	May 2, 1927	May 9, 1927	May 16, 1927†		Market Quoted	May 17, 1926	May 2, 1927	May 9, 1927	May 16, 1927†
Smokeless lump	Columbus....	\$3.10	\$3.35	\$3.35	\$3.25@3.50	Franklin, Ill. lump.....	Chicago.....	\$2.60	\$3.15	\$3.15	\$3.15
Smokeless mine-run.....	Columbus.....	2.05	2.15	2.15	2.10@ 2.30	Franklin, Ill. mine-run....	Chicago.....	2.40	2.60	2.60	†
Smokeless screenings.....	Columbus.....	1.25	1.55	1.35	1.09@1.25	Franklin, Ill. screenings....	Chicago.....	1.90	†	†	†
Smokeless lump.....	Chicago.....	3.10	3.35	3.35	3.25@ 3.50	Central, Ill. lump.....	Chicago.....	2.30	2.85	2.85	2.75@ 3.00
Smokeless mine-run.....	Chicago.....	2.00	2.05	2.05	1.80@ 2.00	Central, Ill. mine-run.....	Chicago.....	2.05	2.35	2.35	†
Smokeless lump.....	Cincinnati.....	3.10	3.10	3.10	3.50	Central, Ill. screenings....	Chicago.....	1.70	†	†	†
Smokeless mine-run.....	Cincinnati.....	1.80	2.25	2.25	2.25	Ind. 4th Vein lump.....	Chicago.....	2.40	3.05	3.05	3.00@ 3.15
Smokeless screenings.....	Cincinnati.....	1.30	1.85	1.85	1.75@ 2.00	Ind. 4th Vein mine-run....	Chicago.....	2.15	2.45	2.45	†
*Smokeless mine-run.....	Boston.....	4.85	4.40	4.40	4.35@ 4.50	Ind. 4th Vein screenings....	Chicago.....	1.80	†	†	†
Clearfield mine-run.....	Boston.....	1.85	1.75	1.70	1.60@ 1.85	Ind. 5th Vein lump.....	Chicago.....	2.15	2.65	2.65	2.60@ 2.75
Cambria mine-run.....	Boston.....	2.10	2.05	2.05	1.90@ 2.25	Ind. 5th Vein mine-run....	Chicago.....	1.95	2.20	2.10	2.00@ 2.25
Somerset mine-run.....	Boston.....	1.95	1.90	1.80	1.75@ 2.00	Ind. 5th Vein screenings....	Chicago.....	1.35	†	†	-1.85@ 2.00
Pool 1 (Navy Standard).....	New York.....	2.60	2.85	2.75	2.50@ 3.00	Mt. Olive lump.....	St. Louis.....	2.35	3.00	3.00	3.00
Pool 1 (Navy Standard).....	Philadelphia.....	2.80	2.85	2.85	2.75@ 3.00	Mt. Olive mine-run....	St. Louis.....	2.15	3.00	3.00	3.00
Pool 1 (Navy Standard).....	Baltimore.....	1.95	2.15	2.15	2.10@ 2.25	Mt. Olive screenings.....	St. Louis.....	1.55	2.00	2.00	2.00
Pool 9 (Super. Low Vol.).....	New York.....	2.10	2.10	2.10	1.90@ 2.25	Standard lump.....	St. Louis.....	2.25	2.75	2.75	2.75
Pool 9 (Super. Low Vol.).....	Philadelphia.....	2.35	2.15	2.15	2.00@ 2.30	Standard mine-run.....	St. Louis.....	1.80	2.00	2.00	2.00
Pool 9 (Super. Low Vol.).....	Baltimore.....	1.75	1.80	1.80	1.75@ 1.85	Standard screenings.....	St. Louis.....	1.30	1.75	1.75	1.75
Pool 10 (H.Gr. Low Vol.).....	New York.....	1.85	1.75	1.75	1.65@ 1.90	West Ky. block.....	Louisville.....	1.75	1.90	1.90	1.85@ 2.00
Pool 10 (H.Gr. Low Vol.).....	Philadelphia.....	2.05	1.80	1.80	1.70@ 1.90	West Ky. mine-run.....	Louisville.....	1.25	1.65	1.60	1.50@ 1.75
Pool 10 (H.Gr. Low Vol.).....	Baltimore.....	1.60	1.65	1.65	1.60@ 1.70	West Ky. screenings.....	Louisville.....	1.10	1.65	1.60	1.50@ 1.75
Pool 11 (Low Vol.).....	New York.....	1.60	1.60	1.60	1.50@ 1.75	West Ky. block.....	Chicago.....	1.75	2.05	1.65	1.60@ 1.75
Pool 11 (Low Vol.).....	Philadelphia.....	1.70	1.65	1.65	1.55@ 1.75	West Ky. mine-run.....	Chicago.....	1.15	1.65	1.45	1.40@ 1.50
Pool 11 (Low Vol.).....	Baltimore.....	1.45	1.55	1.55	1.50@ 1.60						
High-Volatile, Eastern						South and Southwest					
Pool 54-64 (Gas and St.)....	New York.....	1.40	1.50	1.50	1.35@ 1.60	Big Seam lump.....	Birmingham..	2.15	2.15	2.15	1.90@ 2.40
Pool 54-64 (Gas and St.)....	Philadelphia..	1.45	1.45	1.45	1.35@ 1.60	Big Seam mine-run.....	Birmingham..	2.00	1.75	1.60	1.50@ 1.90
Pool 54-64 (Gas and St.)....	Baltimore.....	1.25	1.50	1.50	1.45@ 1.55	Big Seam (washed).....	Birmingham..	2.00	2.00	1.85	1.75@ 2.00
Pittsburgh se'd gas.....	Pittsburgh....	2.30	2.55	2.45	2.40@ 2.60	S. E. Ky. block.....	Chicago.....	2.40	2.25	1.70	1.05@ 2.35
Pittsburgh gas mine-run....	Pittsburgh....	2.05	2.30	2.20	2.15@ 2.25	S. E. Ky. mine-run.....	Chicago.....	1.65	1.65	1.50	1.40@ 1.65
Pittsburgh mine-run (St.)..	Pittsburgh....	1.80	2.25	2.15	2.00@ 2.20	S. E. Ky. block.....	Louisville.....	2.05	2.25	2.25	2.00@ 2.50
Pittsburgh slack (Gas)....	Pittsburgh....	1.50	1.65	1.50	1.45@ 1.60	S. E. Ky. mine-run.....	Louisville.....	1.50	1.60	1.60	1.50@ 1.75
Kanawha lump.....	Columbus.....	2.05	2.35	2.35	2.25@ 2.50	S. E. Ky. screenings.....	Louisville.....	1.05	1.15	1.35	1.25@ 1.50
Kanawha mine-run.....	Columbus.....	1.55	1.60	1.60	1.50@ 1.75	S. E. Ky. block.....	Cincinnati....	2.35	2.35	2.35	2.00@ 2.75
Kanawha screenings.....	Columbus.....	.95	1.15	1.15	1.15@ 1.35	S. E. Ky. mine-run.....	Cincinnati....	1.50	1.55	1.55	1.35@ 1.85
W. Va. lump.....	Cincinnati....	1.85	2.10	2.10	1.75@ 2.50	S. E. Ky. screenings.....	Cincinnati....	1.00	1.20	1.25	1.10@ 1.40
W. Va. gas mine-run.....	Cincinnati....	1.50	1.60	1.65	1.50@ 1.75	Kansas lump.....	Kansas City..	4.00	4.35	4.35	4.25@ 4.50
W. Va. steam mine-run.....	Cincinnati....	1.30	1.35	1.35	1.35@ 1.50	Kansas mine-run.....	Kansas City..	3.00	2.85	2.85	2.75@ 3.00
W. Va. screenings.....	Cincinnati....	1.05	1.15	1.15	1.10@ 1.35	Kansas screenings.....	Kansas City..	2.50	2.50	2.50	2.50
Hooking lump.....	Columbus.....	2.35	2.25	2.25	2.00@ 2.50						
Hooking mine-run.....	Columbus.....	1.55	1.65	1.65	1.75@ 2.00						
Hooking screenings.....	Columbus.....	1.05	1.30	1.25	1.25@ 1.35						
Pitts. No. 8 lump.....	Cleveland....	2.10	†	†	†						
Pitts. No. 8 mine-run.....	Cleveland....	1.65	†	†	†						
Pitts. No. 8 screenings.....	Cleveland....	1.30	†	†	†						

*Gross tons, f.o.b. vessel, Hampton Roads.

†Advances over previous week shown in **heavy type**; declines in *italics*.

‡Quotations withdrawn because of strike.

*Gross tons, f.o.b. vessel, Hampton Roads.

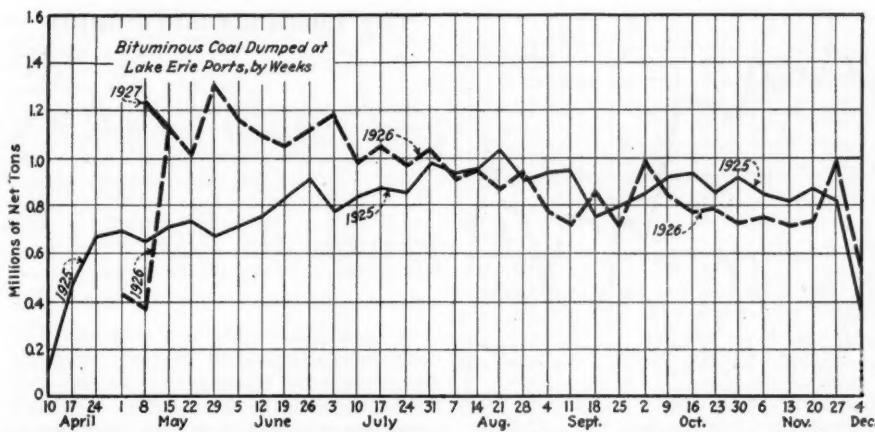
†Advances over previous week shown in heavy type; declines in italics.

‡Quotations withdrawn because of strike.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Freight Rates	May 17, 1926		May 9, 1927		May 16, 1927†	
	Market Quoted		Independent	Company	Independent	Company	Independent	Company
Broken	New York	\$2.34		\$8.25@9.25		\$8.25@8.50		\$8.25@8.50
Broken	Philadelphia	2.39	\$9.25	9.00@9.25		8.25@8.50		8.25@8.50
Egg	New York	2.34	8.75@9.00	8.75@9.25	\$8.25@8.50	8.25@8.35	\$8.25@8.50	8.25@8.35
Egg	Philadelphia	2.39	9.25@9.75	9.15@9.25	8.25@9.00	8.25@8.35	8.25@9.00	8.25@8.35
Egg	Chicago*	5.06	8.48	8.13	7.63	7.63	7.63	7.63
Stove	New York	2.34	9.25@9.75	9.25@9.50	8.50@8.85	8.75@8.95	8.60@8.95	8.75@8.95
Stove	Philadelphia	2.39	9.60@10.00	9.35@9.50	8.85@9.50	8.85	8.85@9.50	8.85
Stove	Chicago*	5.06	8.84	8.33@8.58	8.08	8.08	8.08	8.08
Chestnut	New York	2.34	8.75@9.25	8.75@9.15	8.25@8.50	8.25@8.35	8.25@8.50	8.25@8.35
Chestnut	Philadelphia	2.39	9.25@9.50	9.00@9.15	8.25@9.00	8.25@8.35	8.25@9.00	8.25@8.35
Chestnut	Chicago*	5.06	8.71	8.38@8.50	7.63	7.63	7.63	7.63
Pea	New York	2.22	6.25@7.25	6.00@6.25	5.50@6.00	6.00@6.50	5.50@6.25	6.00@6.50
Pea	Philadelphia	2.14	6.50@7.00	6.00@6.50	6.00@6.75	6.00	6.00@6.75	6.00
Pea	Chicago*	4.79	6.03	5.65@5.80	6.10	6.10	6.10	6.10
Buckwheat No. 1	New York	2.22	1.70@2.50	3.00@3.50	2.75@3.00	2.50@3.00	2.50@2.75	2.50@3.00
Buckwheat No. 1	Philadelphia	2.14	2.00@2.50	2.50@2.75	2.50@3.00	2.50	2.50@3.00	2.50
Rice	New York	2.22	1.40@2.00	2.00@2.25	1.75@1.85	2.00@2.25	1.70@1.85	2.00@2.25
Rice	Philadelphia	2.14	1.75@2.25	2.00@2.25	2.00@2.75	2.00@2.25	2.00@2.75	2.00@2.25
Barley	New York	2.22	1.25@1.50	1.50@1.75	1.20@1.50	1.50@1.75	1.20@1.50	1.50@1.75
Barley	Philadelphia	2.14	1.50@1.60	1.75	1.50@1.75	1.50	1.50@1.75	1.50
Birdseye	New York	2.22	1.30@1.60	2.00	1.35@1.60		1.40@1.60	

*Net tons, f.o.b. mines. †Advances over previous week shown in heavy type; declines in italics.



best steam buyers exhibit only lukewarm interest in the market, confident that their storage piles and the current output give no reason for concern. Domestic demand continues fair, though it slumped somewhat when retailers boosted prices from the April level, which resulted in a return to the April schedule. Most dealers have fair-sized yard stocks and are buying only occasional cars of semi-distress coal.

Shipments are moving more freely from eastern Kentucky to the lakes, but the general movement is disappointing. Production in western Kentucky has slumped about 650 cars per week from the record established late in April, due to reduced demand. The relative unimportance locally of the suspension in the union fields is reflected in prices, which range from a minimum of \$1.25 on screenings to \$2.25 for best block coals, with a little specialty stuff at \$2.50.

Head of the Lakes Active

Tonnage is moving from the docks at the Head of the Lakes in good volume, shipments for April totaling 13,218 cars, compared with 11,855 cars in the corresponding month a year ago. Iron-mining companies are taking liberal tonnages, but retailers and general consumers are slow in contracting with the average price 50c. higher on screenings and other coals compared with last year.

Prepared sizes of smokeless are firm at \$7.50, with screenings at \$4.75. All other screenings, including Youghiogheny, splint and Hocking, are \$4.50. Iron-mining and other industrial consumers are contracting for more dock-run coal than a year ago. Bookings of anthracite are light, but consumption is expected to keep close to the average of recent years.

Seventy-nine cargoes were discharged at the docks last week, including 8 of anthracite, and 24 more, of which 2 are anthracite, were reported en route. An uninterrupted flow is expected now, as heavier iron-ore shipments are scheduled to start this week.

The trade at Milwaukee shows the usual comparatively light seasonal demand fluctuating waningly with temperature. Wholesalers say that if there is any feature of the trade just now it is a steady and strengthening demand for smokeless, which seem to be growing in popularity in this section. Prices on lump are looking upward. However, rates on all fuel are still unchanged, and will probably remain as they are until June steps in.

Industrial consumers, utilities and railroads at the Twin Cities are showing more interest in placing contracts and occasionally stocking ahead, though there is no evidence of alarm. There is little activity in all-rail coal and domestic trade is comparatively quiet.

Restricted demand and, to a lesser extent, the unsettled labor situation are limiting production in the Southwest. Nearly half the Arkansas mines, it is true, are in a position, with respect to labor, to resume operations when storage orders start coming in, and 90 per

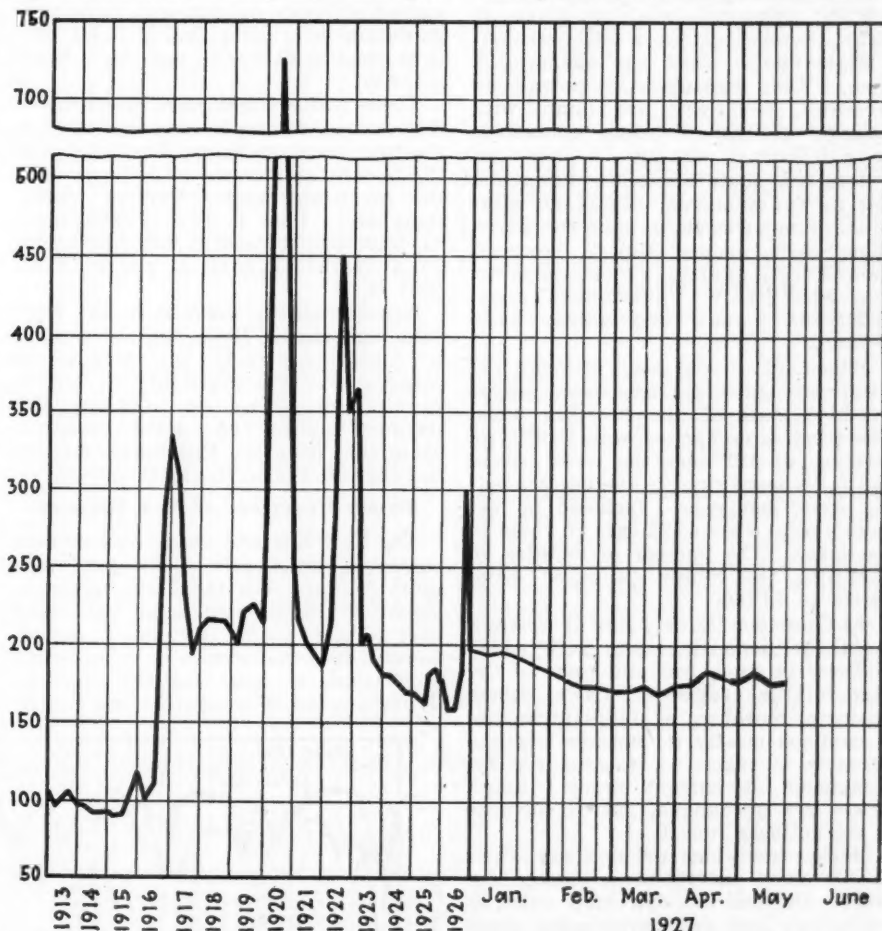
cent of the Oklahoma operations are on a non-union basis, but the only ones running anywhere near full time are working on contracts. Output in Kansas and Missouri, however, could be increased only with considerable difficulty owing to union strength in those fields. Prices are unchanged.

Colorado Trade Unsettled

The situation in Colorado is unsettled; demand for slack is exceptionally good, but inability to market lump and nut sizes hampers operators in filling orders for slack, the price of which has jumped 25 to 40c. Running time at the mines is less than 50 per cent and "no bills" are increasing. Prices for June are: Walsenburg-Canon City lump, \$4.50; nut, \$4.25; washed chestnut, \$3; Crested Butte anthracite, \$7@8.75; northern Colorado lignite lump, \$4; slack, \$1.50@1.85; Rock Springs-Kemmerer (Wyo.) lump, \$4.25; nut, \$3.75; steam sizes, \$1.65.

A cold snap caused a slight flurry in the Utah domestic trade last week. Industrial consumers, however, are taking very little coal, and slack, which is in oversupply, is offered as low as \$1@ \$1.25 at the mines. "No bills" increased 15 to 20 per cent during the week.

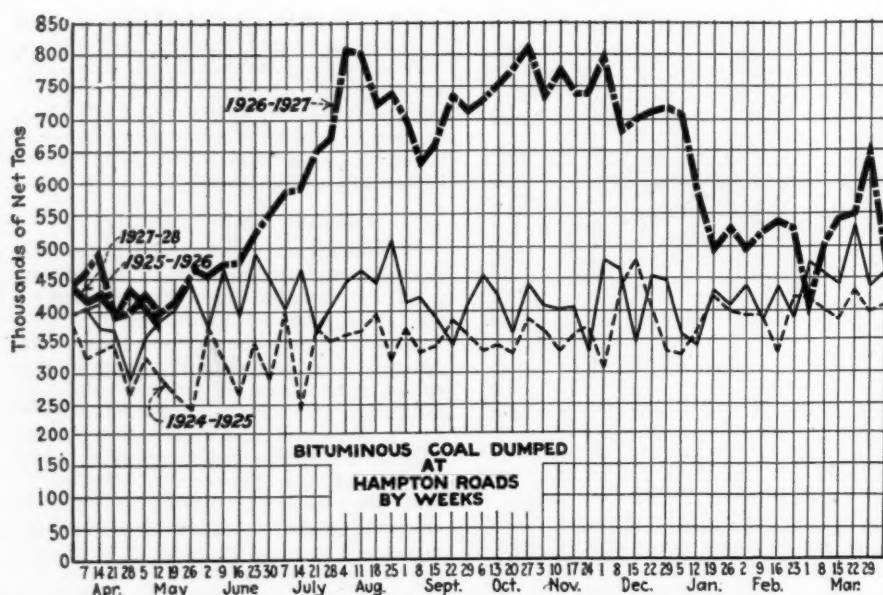
Heavy movement of coal to Cincinnati



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1927				1926	1925
	May 16	May 9	May 2	Apr. 25	May 17	May 18
Index	174	174	177	174	159	161
Weighted average price	\$2.11	\$2.11	\$2.14	\$2.11	\$1.93	\$1.95

This diagram shows the relative, not the actual, price on fourteen coal, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportion each of slack, prepared and run of mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke: 1913-1918," published by the Geological Survey and the War Industries Board. Owing to the suspension of operations in certain unionized fields the figures for April 13 and 25, and May 2, 9 and 16 are tentative only.



has had a steadying influence on that market, serving to check stampede tactics. Smokeless is the center of interest in a buoyant market, with little spot coal available; when it can be found it easily brings \$3.50 for lump and egg; stove firmer at \$2.50@2.75; nut, \$2.25@2.50; mine-run, slightly lower at \$2.25. Screenings are a little weaker.

High-volatile slack has advanced a dime. Wide spreads still prevail on mine-run, 2-in., egg and lump, with tonnage at the minimum quotations more difficult to pick up.

Retailers quote smokeless lump and egg at \$8; mine-run, \$6@6.50; bituminous lump, \$6@6.50; mine-run, \$4.50. School bids, opened May 9, however, showed these figures: Smokeless mine-run, \$4.78@5.50; bituminous lump, \$5.24@6.05; nut and slack, \$3.88@4.65.

Movement of coal loads through the Cincinnati gateway last week topped the high mark of the preceding week. The total interchanged was 15,680, an increase of 121 over the week before and 5,128 more than in the corresponding week last year. Included in last week's total were 4,423 cars en route to the lakes. The number of empties en route to the mines decreased from 14,421 to 13,160.

At Columbus the only sign of strength is in the domestic sizes, with added stiffness in smokeless and some of the high-volatile varieties. The steam business, however, is sluggish; buying is confined mostly to bargain lots and recourse is taken to reserves for the remainder of current needs. Retail prices are unchanged, but an advance is not unlikely June 1.

Market conditions and spot quotations at Cleveland underwent no change last week. Demand was extremely quiet, as consumers feel no apprehension about fuel supplies with stockpiles at their present level.

Ups and Downs at Pittsburgh

The steam coal market at Pittsburgh is weaker with a declining tendency in prices. Gas coal, on the other hand, is a shade stronger, the price of three-quarter showing a slight advance. Operations by the Pittsburgh Coal Co., which were heavy early in the week,

fell off later toward pay day. The Pittsburgh Terminal Coal Corporation is producing some coal, but is not an important market factor as yet. Group 1 mines of the Bessemer district are moving considerable coal, though prices are slightly easier on lump and markedly lower on nut and mine-run. Quotations are: Mine-run, \$1.75@1.80; 1½ in., \$2.10@2.25; nut and slack, \$1.60@1.65.

There was a slight gain in output in the central Pennsylvania field during the first week in May. The total was 12,825 cars, an increase of 356 cars over the preceding week. Current quotations are: Pool 1, \$2.35@2.60; pool 71, \$2.20@2.30; pool 9, \$2@2.15; pool 10, \$1.75@1.85; pools 11 and 18, \$1.65@1.70.

General apathy prevails in the Buffalo market. A little coal is moving on regular contracts, but there is no concern over the possibility of higher prices later, steam quotations at the moment showing an easing tendency. More coal from the Pittsburgh district is being offered in the local market.

Firmer Undertone at New England

The New England steam coal market continues practically unchanged. Inquiry is light, but there are, perhaps, signs of slight firmness as one looks over prices for a two-week period. Certain it is that output is being better supervised, at least for the moment. There are fewer instances of accumula-

Car Loadings and Supply

	Cars Loaded All Cars	Coal Cars
Week ended April 30, 1927.....	1,026,440	162,583
Week ended April 23, 1927.....	955,215	150,787
Week ended May 1, 1926.....	995,641	165,627
Week ended April 24, 1926.....	973,304	166,586

	Surplus Cars All Cars	Car Shortages All Cars
April 30, 1927.....	259,736	90,075
April 23, 1927.....	269,933	95,588
May 1, 1926.....	276,573	115,205

tion, and fewer shippers with distress coal on their hands. In some respects the market for coal on cars at this end is in slightly better shape, although there are still irregularities in price not quite consistent with better business.

At Hampton Roads soft spots are less numerous than a fortnight ago, but the range of price on most coals cannot be said to have changed; \$4.35@4.50 still represents the average spot price, while deferred deliveries are commanding a materially higher basis on the quality grades.

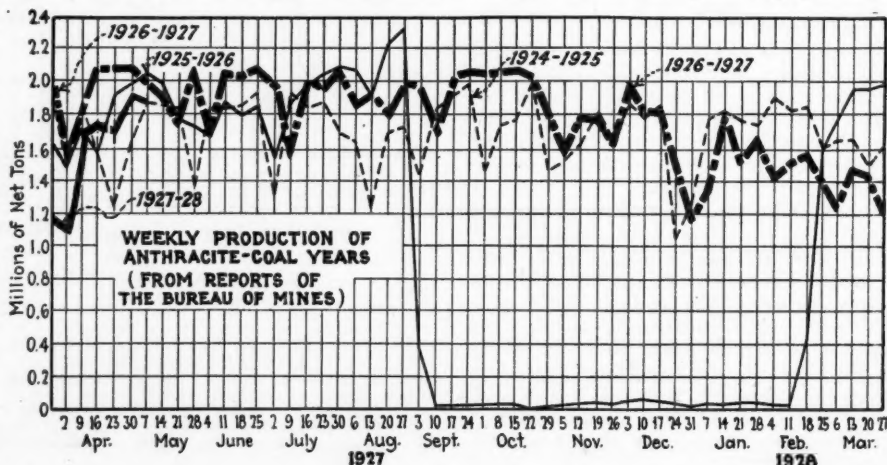
For inland delivery factors here still ask \$5.75@6, but the latter figure is now heard rather more often than for several weeks. Now that the Pennsylvania coals all-rail have about reached their minimum figures it is somewhat easier for local rehandlers of smokeless grades to stabilize their quotations.

Current output in all the districts accessible to this market is more than sufficient to take care of all requirements for weeks to come, but the trade is keenly alert for developments that may tend to show a better balance between supply and demand than has been characteristic thus far this season.

New York Buyers Seek Bargains

Buying of free coals at New York is chiefly done on a bargain-counter basis. Contract coals moved regularly last week and have been sufficient to meet requirements. There are more inquiries, however, and indications for better business early in June are bright. Consumers are using reserve supplies, but it is thought they will soon begin to replenish supplies and buy more in the open market. The Pennsylvania labor situation has not figured so far in the New York market.

At Philadelphia aside from the movement of tonnage to fill existing contracts—mostly to railroads and utilities—there has been little to disturb the funereal calm that generally pervades



the market. The average industrial consumer, unconcerned by the strike, relies on his stockpile and lets the future take care of itself.

With the continuance of extremely light demand at Baltimore competitive coal is frequently sold even below the recognized average low level. Persistent reliance on storage piles, it is believed in some quarters, may cause a backfire of higher prices when consumers are forced to replenish depleted stocks.

Summer Dullness at Birmingham

Spot sales in the Birmingham market are extremely light both in steam and domestic grades. Industrial consumers holding contracts are taking minimum quotas. Coking plants are operating on good schedules and are consuming the normal quantity of washed coal. Quotations are unchanged. Production is approximately 400,000 tons per week and working time ranges from two to four days, depending on requirements.

Hard Coal Trade Steady

Activity in the anthracite market at New York holds up fairly well and quotations for independent domestic coals show more strength. Demand was a trifle stronger early in the week but eased off later. Buying is reflected in increased output and nearly all mines are operating. Scheduled advances in mine prices on June 1 have caused more buying and may result in many orders being carried over into June. Egg is selling more rapidly than either stove or chestnut. The latter size is dragging. The steam coals are moving slowly. All three sizes are easier.

Demand at Philadelphia is fairly satisfactory. Slightly warmer weather has helped summer filling. The producers are moving most of their output readily, though there is a plentiful supply of nut. Stove is strong, egg is enjoying seasonal activity and while pea is not so much sought as a few weeks ago there is no surplus on hand. The steam sizes find a market as quickly as produced. Baltimore dealers are stocking up in anticipation of the price advance on June 1 and are urging consumers to do the same.

Anthracite trade at Buffalo has improved, but dealers are not buying as much as normal at this season. A fair

number of the larger dealers have already taken part of their future requirements, but many are still holding off. The demand from Canada is slow; it is probable that many dealers there will wait until after their annual convention in Toronto, at the end of this month, before placing orders. They will still have a few days' margin before prices advance.

Connellsville Coke Trade Weaker

Offerings are in excess of demand in the Connellsville coke market and softness continues. However, production has been steadily declining, the quantity of coke on track has decreased substantially and it would not take much to stiffen the market. Curtailment of output, it is thought, may clear the air by the time negotiations of third-quarter contracts begins—a few weeks hence. Spot furnace remains quotable at \$3 and standard foundry at \$4@4.75.

Production of beehive coke in the Connellsville and Lower Connellsville region during the week ended May 7, according to the Connellsville Courier, was 115,660 net tons. Furnace-oven output was 70,300 tons, the same as the week before. Merchant-oven output was 45,360 tons, a decrease of 5,930 tons.

Commercial coke prices at Buffalo are weak and buying is on a restricted basis. Retailers state that domestic coke is in indifferent demand.

At Birmingham foundry coke is selling fairly well and quotations are unchanged. Domestic grades are inactive.

Anthracite Circular Prices At New York

	(Per Gross Ton, F.O.B. Mine)				
	Broken	Egg	Stove	Nut	Pea
Lehigh & Wilkes-Barre Coal Co.	\$8.25	\$8.25	\$8.75	\$8.25	\$6.00
Delaware, Lackawanna & Western Coal Co.	8.25	8.25	8.75	8.25	6.00
Phila. & Reading Coal & Iron Co.	....	8.25	8.85	8.25	6.50
M. A. Hanna Co.	8.50	8.25	8.85	8.25	6.00
Hudson Coal Co.	8.35	8.35	8.95	8.35	6.10
Lehigh Valley Coal Sales Co.	....	8.25	8.85	8.25	6.50
Lehigh Coal & Navigation Co.	8.35	8.35	8.85	8.35	6.00
Steam sizes: No. 1 buckwheat, \$2.50@3; rice, \$2@2.25; barley, \$1.50@1.75.					

Byproduct Coke Production Exceeds April Record

Production of byproduct coke in the United States during April amounted to 3,707,000 net tons, a decrease of 172,000 tons, or 4.4 per cent, when compared with the output during the preceding month. This is the largest April output on record, exceeding that of 1926 and 1925 by 2.5 and 12.1 per cent, respectively. The daily rate for April was 123,581 tons, a decrease of 1,536 tons compared with the March rate. The 77 active plants produced about 85 per cent of their capacity.

Output of beehive coke also declined, the total for the month being estimated at 780,000 tons, a decrease of 110,000 tons, or 12.4 per cent, when compared with March. The daily rate of 29,983 tons shows a decrease of 7 per cent.

Output of all coke was 4,487,000 tons, of which 82.6 per cent was contributed by byproduct ovens and 17.4 per cent by beehive ovens.

Byproduct and Beehive Coke Output In the United States by Months*

	(In Thousands of Net Tons)		
	Byproduct	Beehive	Total
1924 Monthly average	2,833	806	3,639
1925 Monthly average	3,326	946	4,272
1926 Monthly average	3,712	957	4,669
January, 1927	3,700	787	4,487
February, 1927	3,435	754	4,189
March, 1927	3,879	890	4,769
April, 1927	3,707	780	4,487

* Excludes screenings and breeze.

Coal used for the manufacture of coke amounted to 6,557,000 tons during April, 5,327,000 tons being consumed in byproduct ovens and 1,230,000 tons in beehive ovens.

Estimated Coal Consumed Monthly In Manufacture of Coke

	(In Thousands of Net Tons)		
	Byproduct	Beehive	Total
1924 Monthly average	4,060	1,272	5,332
1925 Monthly average	4,759	1,452	6,211
1926 Monthly average	5,334	1,509	6,843
January, 1927	5,316	1,241	6,557
February, 1927	4,935	1,189	6,124
March, 1927	5,573	1,404	6,977
April, 1927	5,327	1,230	6,557

Of the total production of byproduct coke during April, 3,097,000 tons, or 83.5 per cent, was made in plants associated with iron furnaces, and 610,000 tons, or 16.5 per cent, was made at merchant or other plants.

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season to End of April

Ports	Railroads	(In Net Tons)								
		Cargo	1927 Fuel	Total	Cargo	1926 Fuel	Total	Cargo	1925 Fuel	Total
Toledo	Hocking Valley	1,027,108	25,983	1,053,091	392,605	12,754	405,359	739,538	21,879	761,417
	Big Four	226,427	144	226,571	68,894	356	69,250	138,101	....	138,101
	N. Y. C.-Ohio Central Lines	321,403	13,589	334,992	58,236	3,594	61,830	64,280	6,204	70,484
Sandusky	Baltimore & Ohio	316,841	8,392	325,233	138,743	3,115	141,858	219,566	7,021	226,587
	Pennsylvania	728,557	19,953	748,510	160,352	4,863	165,215	246,473	7,267	253,740
Huron	Wheeling & Lake Erie	89,129	3,213	92,342	46,768	1,754	48,522	115,037	5,056	120,093
Lorain	Baltimore & Ohio	344,468	17,703	362,171	36,830	7,787	44,617	21,848	10,308	32,156
Cleveland	Pennsylvania	115,958	10,655	126,613	....	3,924	3,924	5,870	8,796	14,666
	Erie	7,349	....	7,349	....	....	....	16,544	933	17,477
Fairport	Baltimore & Ohio	133,833	10,289	144,122	8,198	2,414	10,612	13,037	6,187	19,224
Ashtabula	New York Central	137,293	8,278	145,571	11,341	2,307	13,648	52,180	5,800	57,980
	Pennsylvania	78,895	4,015	82,910	54,310	2,952	57,262	36,048	2,554	38,602
Conneaut	Bessemer & Lake Erie	134,598	10,559	145,157	47,587	6,065	53,652	19,683	9,935	29,618
Erie	Pennsylvania	105,592	7,965	113,557	....	1,123	1,123	5,589	5,064	10,653
Totals		3,767,451	140,738	3,908,189	1,015,864	53,008	1,068,872	1,693,794	97,004	1,790,798
Storage loading		*126,460	2,654	129,114	....	....	....	*33,017	1,048	34,065

* Coal loaded into vessels in December, of previous year, after close of navigation and forwarded from Lake Erie ports during year indicated. Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

Foreign Market And Export News

Coal Supply Exceeds Demand In British Market

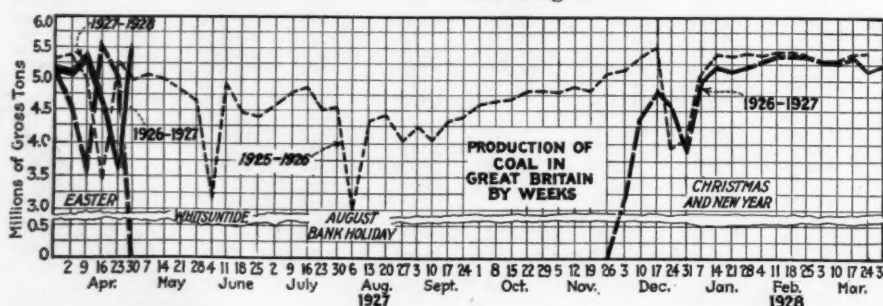
Demand for coal in the United Kingdom is slower due partly to seasonal conditions and partly to the reaction from abnormal requirements following the strike period, which have now been met, according to a cable to the Department of Commerce from Commercial Attaché William L. Cooper, London. April exports of 4,117,500 tons were 15 per cent below those in March. Imports were 24,000 tons in April.

Production for the week ended April 30 was 5,500,100 tons, the largest output since the strike. Production during that week a year ago amounted to 5,096,300 tons, the best previous weekly output since the suspension was 5,371,400 tons. In the week preceding the period covered by the last return, only 3,640,000 tons were produced, and in the middle week of April 4,683,300. Production during the third week of April, which was abnormally small, was restricted by the Easter holidays. Excess of supplies over demand is causing much part-time working.

Firmer Tone Marks Trade In French Market

Paris, May 5.—The French market is stronger although reasons for this improvement are difficult to determine. It is said that the usual spring-time improvement was scarcely noticed this year and that, as a consequence, operations of the French mines were much curtailed. However, British coals sold on the continent are firmer and this may account for the better conditions in the local markets.

Demand for domestic coals is good, which is customary at this time of year, as householders are taking advantage of the summer reduction in prices. Inducements in April were the most attractive, prices for May are a few francs higher and, as the season advances, there will be further increases. Retail stocks were depleted as a result of the spring demand and, as a consequence, colliery operations were much improved. Anthracite coals are not abundant, as is evidenced by the fact that both producers and importers are having difficulty in readily meeting the demand.



Retail prices in Paris are generally 3 fr. higher than last month. Freight rates are increasing as the time when the canals will be closed to traffic approaches. Movement by rail is growing as shippers return to this form of transportation when freight rates by water become high.

No progress has been made in the negotiations between the French metallurgists and the coke producers of Germany who continue to refuse what the former consider necessary concessions. The French did not accept the price of 17 mk., 85 pfg., per metric ton offered on the basis of an 18 month's contract.

Large tonnages of French metallurgical coke are being moved at 155 fr. per metric ton—five to six times the pre-war figure.

During the first 23 days of April, 108,400 metric tons of reparation coal was received from Germany. During the same period, only 200 metric tons of coke were received as reparation payments.

In March, the total coal production of French mines amounted to 4,724,489 metric tons compared with 4,357,676 tons in February. Production of lignite amounted to 98,041 metric tons; coke, 344,101 tons; and patent fuel, 294,455 tons. These figures for February were: Lignite, 93,314 metric tons; coke, 312,525 tons; and patent fuel, 250,572 tons.

Belgian Market Advances To Firmer Ground

The situation in the Belgian market shows a gratifying advance toward firmer ground. Household fuels are enjoying a volume of orders in excess of former years at this period. Large shipments of anthracite grades are going to France and Holland and semi-bituminous likewise shows an improvement.

Industrial consumers evince a slight renewal of interest, and though the betterment is modest it is none the less gratifying. There is a fair demand for bituminous and prices remain firm. Competition from foreign coals is less in evidence. Both Great Britain and Germany are exporting more coal to other countries and, as a result, less coal from those countries is moving into Belgium.

Coke is quiet as production has exceeded consumption. Patent fuels are only in fair demand but this condition is not serious.

It would appear that the bottom of the present decline has been reached and that from now on the market will tend toward firmer ground.

German Trade Recovering

Coal production in Germany is again recovering. Even the Ruhr coal syndicate announces an increase of 7½ per cent in home prices—against which, however, the Minister of Industry may exercise his right of veto.

Export Clearances of Coal Week Ended May 12

FROM HAMPTON ROADS

	Tons
For Trinidad:	
Nor. Str. Christian Krogh, for Port of Spain	1,525
For Newfoundland:	
Nor. Str. Hertha, for Corner Brook	1,050
For Portugal:	
Port. Str. Sandades, for Lisbon	5,128
For Cuba:	
Br. Str. Berwindmoor, for Havana	9,378
Nor. Str. Certo, for Havana	3,264
For Hawaii:	
Amer. Str. Eclipse, for Honolulu	1,780
For Canada:	
Br. Str. Holmewood, for Montreal	2,997
For Argentina:	
Dan. Str. Nordpol, for Rosario	3,992
Br. Str. Portuguese Prince, for La Plata	3,004
For Martinique:	
Br. Str. Hollypark, for Fort de France	5,003

Hampton Roads Coal Dumpings*

(In Gross Tons)

	May 5	May 12
N. & W. Piers, Lamberts Pt.:		
Tons dumped for week	119,298	108,763
Virginian Piers, Sewalls Pt.:		
Tons dumped for week	107,919	96,144
C. & O. Piers, Newport News:		
Tons dumped for week	133,186	123,061

*Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

Pier and Bunker Prices

(Per Gross Ton)

	PIERS	May 5	May 12†
Pool 1, New York	\$5.50@5.75	\$5.50@5.75	\$5.50@5.75
Pool 9, New York	5.00@5.25	5.00@5.25	5.00@5.25
Pool 10, New York	4.75@5.00	4.75@5.00	4.75@5.00
Pool 11, New York	4.50@4.75	4.50@4.75	4.50@4.75
Pool 9, Philadelphia	5.00@5.05	4.80@4.95	4.80@4.95
Pool 10, Philadelphia	4.75@4.95	4.55@4.80	4.55@4.80
Pool 11, Philadelphia	4.40@4.50	4.35@4.70	4.35@4.70
Pool 1, Hamp. Roads	5.00@5.10	4.50@4.65	4.50@4.65
Pool 2, Hamp. Roads	4.65	4.40@4.50	4.40@4.50
Pool 3, Hamp. Roads	4.25@4.35	4.20@4.30	4.20@4.30
Pools 5-6-7, Hamp. Rds.	4.40	4.20	4.20

BUNKERS

Pool 1, New York	\$5.75@6.00	\$5.75@6.00
Pool 9, New York	5.25@5.50	5.25@5.50
Pool 10, New York	5.00@5.25	5.00@5.25
Pool 11, New York	4.75@5.00	4.75@5.00
Pool 9, Philadelphia	5.25@5.40	5.00@5.20
Pool 10, Philadelphia	5.00@5.25	4.80@5.05
Pool 11, Philadelphia	4.75@5.00	4.60@4.95
Pool 1, Hamp. Roads	5.10	4.65
Pool 2, Hamp. Roads	4.75	4.50
Pools 5-6-7, Hamp. Rds.	4.50	4.30

†Advances over previous week shown in heavy type; declines in italics.

Current Quotations, British Coal, F.o.b. Port, Gross Ton

Quotations by Cable to Coal Age

	May 7	May 14†
Cardiff:		
Admiralty, large	23s. 3d.	22s. 6d.
Steam smalls	14s.	14s. 3d.
Newcastle:		
Best steams	19s.	19s.
Best gas	17s. 6d.	17s. 6d.

†Advances over previous week shown in heavy type; declines in italics.

Trade Literature

The K S G Process for low-temperature carbonization of coal. International Combustion Engineering Corporation, New York City. Publication IC-3. Pp. 11; 8½x11 in.; illustrated. Describes the process and results obtained from its installation in two plants in Germany.

New Obround Condulets, Form 7. Crouse-Hinds Co., Syracuse, N. Y. Folder No. 50 gives the distinct and novel features of these condulets.

International Combustion Engineering Corporation, New York City, has issued a 25-page publication, IC-2, containing charts, illustrations and description of the remodeling of one of the large steam generating units at the Fordson plant of the Ford Motor Co., which enabled the capacity to be more than doubled.

Cutting and Grinding Facts. Sun Oil Co., Philadelphia, Pa. Pp. 22; 4x8½ in.; illustrated. Describes the adaptability of Sunoco emulsifying cutting oil for different kinds of work on all types of machines and materials.

Motor Maintenance Equipment. The Martindale Electric Co., Cleveland, Ohio. Catalog No. 8. Pp. 32; 8x10½ in.; illustrated. Describes commutator slotting and grinding equipment and includes a carbon brush maintenance and trouble chart giving analysis of causes and effects of brush and commutator troubles in direct-current motors and generators.

Dry Grinding with the Hardinge Conical Mill and Reverse Current Air Classifier. Hardinge Co., York, Pa. Bulletin No. 17-A. Pp. 15; 8½x10½ in.; illustrated. Outlines the principles and describes the methods employed for grinding various materials dry.

Edison Lamp Works of the General Electric Co., Harrison, N. J., has issued Bulletin LD, 147A, on **Lighting for Street Traffic Control**, and Bulletin LD, 155, on **Illumination Terms**.

The Godfrey Conveyor Co., Elkhart, Ind., has issued a folder illustrating and describing its **Type GP-5 Heavy Duty Machine**, for use in yards where continuous service is required, and **Type GP-6 Service Machine**, for use where tonnage does not require the heavy-duty machine.

Power Hoe. Link-Belt Co., Chicago, Ill. Book No. 666. Pp. 15; 6x9 in.; illustrated. Describes the operation and advantages of this improved drag scraper.

Mine Safety Appliances Co., Pittsburgh, Pa., has issued a booklet, **Surgical Dressings**, including dispensary supplies and stretcher outfits.

New Companies

The J. H. Somers Coal Co., of Cleveland, Ohio, with a capital of 5,000 shares of stock, no par value, has been chartered to mine, sell and distribute coal and coke. Incorporators are Howard L. Doyle, Roland R. Foley, Harold R. Moore, George H. Rudolph and Read M. Kuhns.

New Equipment

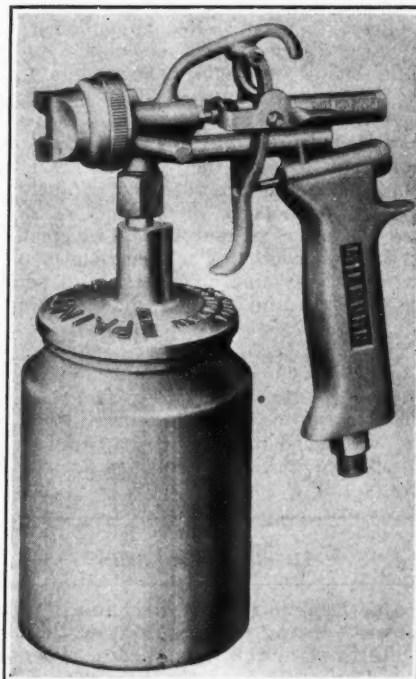
New 3-in-1 Paint Spray Has Many Uses

The spray gun is becoming the universal tool used in coating various surfaces with paint, varnish, enamel, lacquer, etc. The great savings in time, material and labor made possible by the use of efficient spray equipment stamp this process as the modern method of painting.

The Alexander Milburn Co., 1416-1428 West Baltimore St., Baltimore, Md., has developed a 3-in-1 spray gun which is adaptable to fine work such as painting and lacquering automobiles, furniture, etc., or to less particular operations such as painting machinery, freight cars, etc.

This is a triple-purpose gun for use either as a siphon-feed, pressure-feed or gravity-feed spray. It is immediately adaptable to use by whichever method may be most convenient for the work. The scientific construction of this gun allows it to be used with low air pressure or with an ordinary garage compressor.

Consistent with the kinds of work encountered, it is claimed that the Milburn multiple-head adjustment by a simple operation permits either a flat, fan spray (either in a horizontal or a vertical position) or a round one. The atomization is so fine and even that "orange-peel" is said to be eliminated and sanding and rubbing minimized. It is further stated that the Milburn spray



Makes Painting Easy

This "gun," of all-metal construction, is rugged, light and evenly balanced. Manipulation is easy and simple, and a quickly adjustable head permits of a flat or round spray at will. It is non-clogging and easily cleaned and dripping of paint is eliminated as the fluid is positively shut off at the nozzle.

can be so accurately adjusted that it can be used for touching up, shading and high lighting. An air pocket, formed by the fan-shaped nozzle, completely surrounds the atomized spray and lessens the loss of material through evaporation and utilizes the entire efflux in thoroughly covering the surface. When dusting is desired, a trip lever is raised, allowing only the air to function and completely shutting off the paint supply.

Both the air and paint valves are operated simultaneously. By pulling the trigger, paint flows to the atomizing chamber, is expanded and driven with ample force into the pores of the surface to be covered. Daubing and brush marks are eliminated.

Concealed Type Bond Fixed To Edge of Rail Base

Where conditions in a mine are favorable, a highly desirable type of bond is one that may be welded to the base of the rail in such a way that it is practically concealed. It is claimed that



Copper-Alloy Weld Bond

This bond, as it is applied to the edge of the base and underneath the rail, is said to be protected against injury from dragging equipment and derailed cars. Simplicity and cheapness of application, with resulting lower costs, are claimed for this device in those installations where it can be used.

the combination of this protection from dragging equipment and derailed cars, with provision for easy welding, has been secured in the new AW-15 copper-alloy weld bond just announced by the Ohio Brass Co.

The terminals are a modification of those used on the type AW-12 bond, which is applied to the top of the rail base. The new bond terminals have hooks which engage with the edge of the rail and are designed to grip rails up to 30 lb. in size. In application the cable is placed in a position underneath the rail and the only exposed part is the welding area of the terminal. Welding is done with a copper-alloy rod and the electric arc. Extension of the cable strands into the terminal for some distance assures complete fusion of each strand into the deposited metal.

As it is a short bond (7-in. cable)

only a few inches of the rail at the joint is spanned. Simplified application and a minimum of copper make for a minimum cost of installation, it is stated. The manufacturer recommends the use of this bond only where excessive corrosion will not result from placing the bond underneath the rail. The bond can be applied where the splice plate does not cover the edge of the rail base, but cannot be used with angle bars.

Cord Disk Flexible Couplings Permit Maximum Torque

Improvements on the old-type flat disk in a flexible coupling have been announced by the Climax Motor Appliances, Inc., 7016 Euclid Ave., Cleveland, Ohio. This new Climax cord disk deviates from the old type of flat disk in that improved features have been incorporated in the raised cord links extending from bolt to bolt which, it is stated, add both strength and durability.

The semi-spherical rubber bosses at the bolt intersection are integral with the disk and are used as driving members. The metal members used in connection are formed to fit the bosses on the one side, and on the reverse side special cup washers are provided. This construction, it is claimed, overcomes the difficulty experienced in using a flat washer by eliminating the critical angularity of the working clearances between the washer diameters. This construction also makes it possible to transmit the maximum torque without fear of destruction.

These disks are made up for industrial use in sizes from 5½ in. to 16 in. outside diameter, and permit the coupling hubs to be made in various sizes so as to accommodate shafting from ¾ in. to 8 in. in diameter. The manufacturer states that power can be transmitted under the most severe conditions, for example on a fixed angle of 3 deg., varying from ¼ hp. for the 5½-in. disk to 30 hp. for the 16-in. disk, at 100 r.p.m. Under favorable conditions it is stated that the rating could be increased to as much as seven times the figures given.

Siren Makes Good Signal

Development of a new electric siren for use as a fire alarm at mines, in villages, schools, industrial plants, factories, and warehouses has recently been announced by the Federal Electric Co., 8700 South State St., Chicago, Ill. This siren is also designed to serve as a start- and quit-work signal at industrial plants, factories and mines.

The "Triple-A" siren as it is called really consists of three sirens, mounted on a triangular base, connected in parallel and operated from one push button switch. Each machine consumes approximately ¾ hp.—making a total for the Triple-A, of 1 hp.

The tone of each of the three sirens is different from that of the other two thus, it is said, producing a pleasing combination of sounds. With a siren mounted on each angle of the triangular base, this machine throws a penetrating note in every direction which it is



Light But Powerful

This siren weighs only 40 lb. but can be heard for half a mile under normal conditions. Dependable, easy to operate and requiring but little maintenance, it has a multiplicity of applications.

claimed, has a sound radius of from ¾ to 1 mile under normal conditions.

The maintenance cost of this siren is stated to be less than \$2 a year. It is extremely simple in construction, is entirely inclosed and is, therefore, free from rusting and corrosion. The motor housings, stators, and rotors are of die cast aluminum. The horns and weather housings over the motor cases are made of seamless spun steel. The entire unit is finished in red Duco and weighs only 40 lb. The device is easy to operate, entirely dependable and requires little or no attention. Perfect lubrication is assured by oiling two or three times a year.

New Welding Electrode

A new type of welding electrode which combines the characteristics of a fluxed electrode and the quality of bead finish and the cleanness in handling of a bare welding electrode has been introduced by the merchandise department of the General Electric Co. at Bridgeport, Conn. Recommended for the general welding of steel, the electrode has a uniform flowing quality. The absence of sputtering or spattering, characteristic of the usual commercial bare welding wire, is one of the features of the new material. Elimination of the erratic arc condition leads to a deposit of more material with the same consumption of electrode per kilowatt-hour. The electrode penetrates quickly and produces high tensile strength and unusual ductility and elongation.

The electrode, which has been designated GE Type F, is furnished in ⅜-, ½-, ⅝-, and ¾-inch sizes. The standard package is 50 lb., burlapped. It is also furnished on steel reels (approximately 200 lb.) or in coils of approximately 150 or 200 lb.

Coming Meetings

American Society of Mechanical Engineers. Spring meeting, May 23-26, at White Sulphur Springs, W. Va. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

National Foreign Trade Convention. Detroit, Mich., May 25-27. Secretary, O. K. Davis, India House, Hanover Square, New York City.

Society of Industrial Engineers. Fourteenth national convention, Hotel

Stevens, Chicago, Ill., May 25-27. Executive secretary, E. Van Neff, 17 E. 42d St., New York City.

American Wholesale Coal Association. Annual convention, June 1-3, Toronto, Canada. Secretary-treasurer, R. B. Starek, Chicago Temple Bldg., Chicago, Ill.

Pennsylvania Retail Coal Merchants' Association. Annual convention, Wilkes-Barre, Pa., June 1-3. Secretary, W. M. Bertolet, Reading, Pa.

National Retail Coal Merchants Association. Annual convention, June 6-8, Detroit, Mich. Resident vice-president, Joseph E. O'Toole, Washington, D. C.

Association of Iron and Steel Electrical Engineers. Annual convention in conjunction with the Iron and Steel Exposition, at Pittsburgh, Pa., June 13-18. Secretary, John F. Kelly, Empire Bldg., Pittsburgh, Pa.

New England Coal Dealers' Association. Annual meeting June 14-16, Hotel Griswold, New London, Conn. Executive secretary, E. I. Clark, Boston.

Colorado and New Mexico Coal Operators Association. Meeting at Boston Building, Denver, Colo., June 15. Secretary, F. O. Sandstrom, Denver, Colo.

National Coal Association. Annual meeting June 15-17, at Edgewater Beach Hotel, Chicago. Executive Secretary, Harry L. Gandy, Washington, D. C.

Illinois Mining Institute. Summer meeting June 16-18 at La Salle, Ill., by Steamer Cape Girardeau. Secretary, Frank F. Tirre, 603 Fullerton Bldg., St. Louis, Mo.

American Society for Testing Materials. Thirtieth annual meeting, French Lick Springs Hotel, French Lick, Ind., June 20-24. Secretary, C. L. Warwick, 1315 Spruce St., Phila., Pa.

American Institute of Electrical Engineers. Summer convention, June 20-24, at Detroit, Mich. Regional meeting, May 25-27, Pittsfield, Mass. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

Mining Society of Nova Scotia. Annual meeting at Baddeck, Nova Scotia, Canada, June 21-22. Secretary-Treasurer, E. C. Hanrahan, Sydney, N. S., Canada.

International Chamber of Commerce. Fourth congress at Stockholm, Sweden, June 27 to July 2.

Michigan-Ohio-Indiana Coal Association. Annual convention at Cedar Point, Ohio, June 28-30. Secretary, B. F. Nigh, Columbus, Ohio.

Illinois and Wisconsin Retail Coal Dealers' Association. Annual convention, the Hotel Pfister, Milwaukee, Wis., June 28-30. Managing Director, N. H. Kendall, 706 Great Northern Bldg., Chicago, Ill.

Annual First-Aid Meet for championship of Pennsylvania (open to mining and industrial teams), Ebensburg Fair Grounds, July 9. Superintendent, H. D. Mason, Jr., Box 334, Ebensburg, Pa.

Second (Triennial) Empire Mining and Metallurgical Congress opens at Montreal, Can., Aug. 22 and continues to Sept. 28, under the auspices of the Canadian Institute of Mining and Metallurgy. Secretary, George C. Mackenzie, 604 Drummond Building, Montreal, Can.